



M I C R O F I L M  
A B S T R A C T S

*A Collection of Abstracts of Doctoral  
Dissertations which are Available  
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U N I V E R S I T Y M I C R O F I L M S

ANN ARBOR, 1941

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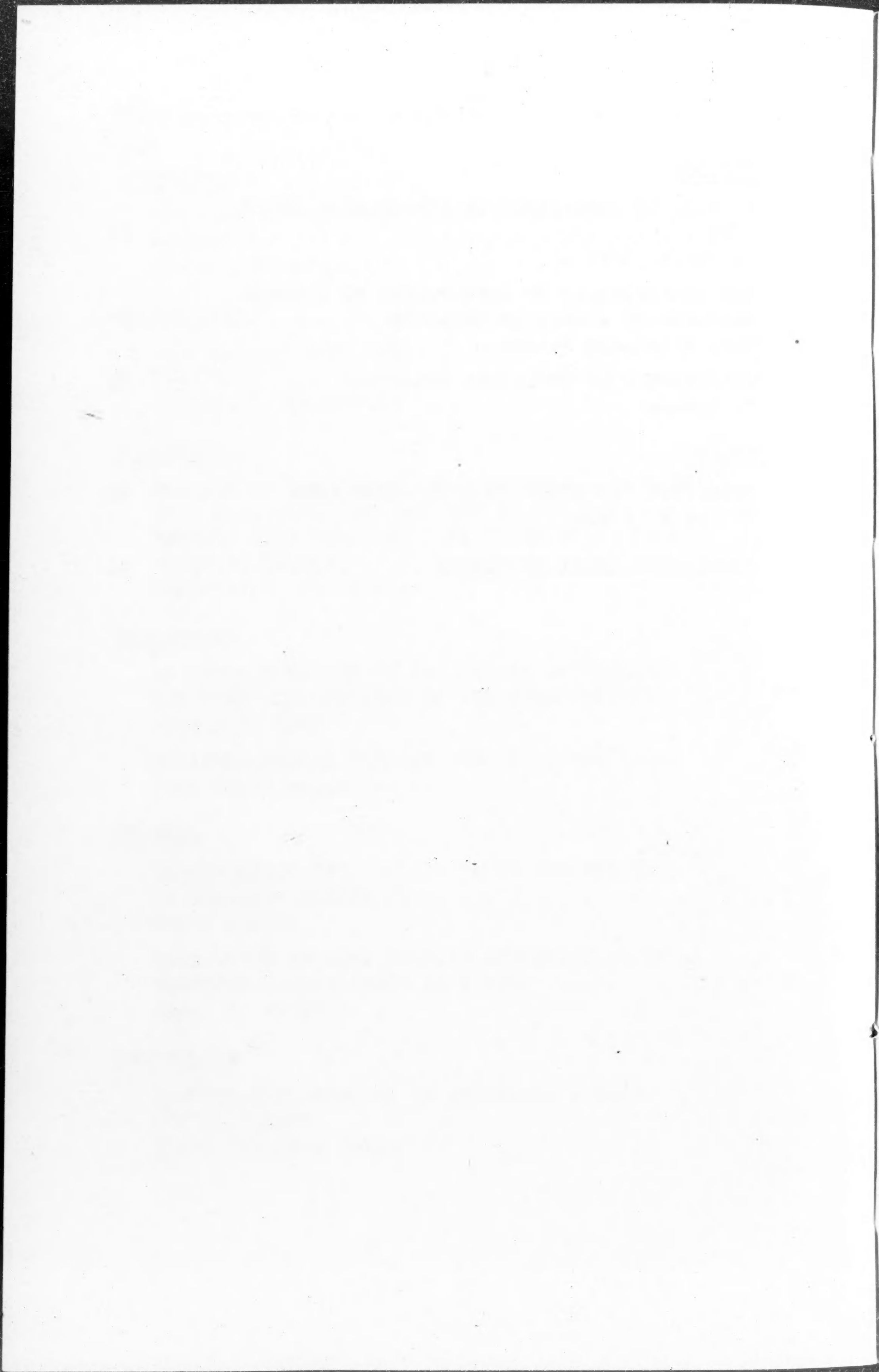


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## INTRODUCTION

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October 12, 1941

Eugene B. Power

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## ATHLETICS

### SWIMMING AS A MOTOR SKILL

Harold W. Copp, Thesis (Ph.D.)  
University of Michigan, 1940

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the University of Michigan.

The purpose of the study was to analyze the changes in the partial activities which make up the total performance during the learning of the motor skill of swimming. While the study of learning to swim was the main object of the inquiry, the factor of relaxation was investigated specifically because of its recurring emphasis in the literature of the subject. The specific problem, therefore, was to examine relaxation as a factor in the progress of boys learning to swim.

Data were obtained as follows: (a) From the theoretical standpoint, over 900 books and articles on learning, relaxation, and swimming were reviewed. (b) Over 86,000 intermittent air and underwater pictures were taken at intervals of approximately one second on 16 mm. moving picture film throughout the experiment. (c) Over 26,000 words of short abbreviated expressions were dictated on records. (d) Automatic records were taken of leg kick and arm pull; also movements made during resting tests. (e) School records were secured of I.Q., age, height, and weight. (f) A questionnaire was sent to parents regarding family swimming history. (g) Supplementary measures were made of body size, specific gravity, etc.

An experimental group was given instruction once each week for sixteen weeks in swimming and relaxation while a control group was instructed in swimming without the training in relaxation. It had been assumed that the training given out-of-water would result in the ability to relax while swimming.



If this did occur, it produced no measurable difference in the learning of the two groups; and improvement in relaxation showed no correlation with rate of learning ( $r=+ .08 \pm .15$ ). This may not be the case.

Although the dynamometer record of leg kick and arm pull was taken but once after about two and one-half hours of experience in the water, the correlation with rate of learning to swim was  $+.98 \pm .006$ . The author would like to present more data from this source but the dynamometer curves were not measured, and the high positive correlation was not noted until some time after the experimental work, when the particular subjects used were no longer available for further study. Such a high correlation merits further investigation, however, beyond the limits of this study, and these findings are presented as a challenge. Is arm pull and leg kick a factor that can be isolated and measured during the learning; or, if it cannot be isolated, can the evidence of the development of power be measured at the same time as the arm pull and leg kick develops into a coordinated swimming skill?

The following learning patterns appear from an analysis of observation, dictation, intermittent pictures, and moving pictures: Subjects made good progress in learning to swim (a) who showed strong forceful movements of arms and legs associated with elements of play even with relatively poor form; (b) who developed relaxed extended movements, further characterized as gliding, lunging, thrusting, or sweeping movements; (c) who had difficulty with stunts but who stayed with them until mastered and then repeated them many times successfully. Subjects made poor progress (a) who used contracted movements resembling clawing, grasping, or fighting, associated with fear; (b) who showed hesitation in early orientation stunts such as jumping in or putting the head under water, and who did not master these stunts on the same day; (c) who showed unsocial attitudes such as aloofness and shyness, despite apparent ability to perform the separate skills.

Problems of isolation and control encountered, many unforeseen and not previously investigated, made the study into one of exploration. It is probable that detailed investigation of such variables as time in the water, temperature, breathing, and motor educability would be profitable.

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## BACTERIOLOGY

### ATTEMPTS TO INFECT LABORATORY ANIMALS WITH STRAINS OF BACILLUS VIOLACEUS ISOLATED FROM HUMAN BEINGS

Matthew C. Dodd, Thesis (Ph.D.)  
University of Michigan, 1941

A series of experiments was conducted to investigate the effect of the injection of laboratory animals with two strains of Bacillus violaceus isolated from fatal human infections. An old laboratory strain, originally isolated from river water was included for comparative purposes. Suspensions of the three strains were injected into guinea pigs, mice and rabbits by various routes and the effects observed.

The guinea pigs were inoculated subcutaneously and intraperitoneally with 0.5 cc. of suspensions of forty-eight-hour agar slant cultures containing approximately 500 million organisms. The results indicated that strain S (human origin) produced a fatal infection by the intraperitoneal route while no untoward effects were observed in animals similarly treated with strain M (human origin) and strain O (old laboratory strain). The subcutaneous injection of the three strains produced an inflammatory lesion at the site of inoculation which quickly healed and there was no sign of a generalized infection. Vitamin C deficient guinea pigs inoculated subcutaneously showed a similar reaction with the exception that the lesions healed more slowly and viable organisms were present in the lesions longer than in normal controls. On one occasion after culture on semi-solid agar in the presence of 20-25 per cent carbon dioxide, the three strains produced severe lesions with extensive oedema and necrosis at the site of inoculation in guinea pigs inoculated subcutaneously. Sixty per cent of those treated with strain S died from a bacteremia. It was found also



that organisms from ordinary cultures of all three strains when suspended in the filtrate of cultures of strain S grown under carbon dioxide produced a fatal infection in guinea pigs injected subcutaneously.

Mice were also injected by the same routes and only strain S produced a progressive infection. Strains M and O were fatal only when large doses of organisms were given intraperitoneally, probably as a result of the toxicity of the germs. Serial passage of the three strains in mice failed to influence their virulence. In many instances an organism resembling Bacillus coli was isolated from the blood of mice dying from the effects of the intraperitoneal injection of large quantities of Bacillus violaceus.

Strain S was also virulent for rabbits by the intraperitoneal route and all three strains were toxic for rabbits when injected intravenously. This latter effect was obtained also with heat-killed, phenolized and washed cultures. An increase in this toxic effect was detected in cultures incubated in the presence of 20-25 per cent carbon dioxide.

An attempt was made to detect an exotoxin in filtrates of ordinary broth cultures and in filtrates of cultures grown on semi-solid agar in the presence of 20-25 per cent carbon dioxide by injection intravenously into rabbits and intraperitoneally into mice. None was demonstrated in the broth culture filtrates, but filtrates of cultures of all three strains incubated under 20-25 per cent carbon dioxide were toxic for rabbits in 1.0-1.5 cc. doses. In addition, the filtrate of strain S killed mice in quantities of from 0.2 cc. to 0.4 cc. or higher. Rabbits were actively immunized to the toxic effect of all three filtrates and mice to the effect of the S filtrate, as well as to subsequent injection of suspensions of the living organisms. However, attempts to passively immunize mice with immune serum failed. This lack of antitoxigenic power, the instability of the toxic factor, the large quantities required to produce toxic symptoms, and the difficulty

of producing successive uniform samples were not suggestive of an exotoxin. It was concluded that the toxicity of suspensions of Bacillus violaceus was due mainly to a heat-stable endotoxin which could be detected in filtrates of cultures grown under 20-25 per cent carbon dioxide.

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A NEW TYPE OF GASEOUS FERMENTATION OCCURRING  
DURING THE SALTING OF CUCUMBERS

John L. Etchells, Thesis (Ph. D.)  
Michigan State College, 1941

A study was made of the microorganisms responsible for the production of hydrogen in cucumber fermentations.

The experimental work dealt chiefly with the isolation, identification and biochemical studies of this group of organisms as well as observations upon their typical fermentations under commercial conditions.

Twenty-nine strains were isolated from cucumber fermentations in salt ranging from 20 to 60 per cent saturation. Detailed studies of the morphological, cultural and physiological characteristics of 20 of these strains placed them in the genus Aerobacter, and showed that they conformed more closely to the cloacae species than to aerogenes, the only other species now described in Bergey's Manual.

Fermentations in buffered dextrose broth, cucumber juice and 19 carbon compounds were studied. Influence of salt, pH and temperature was determined in dextrose broth for the type strain, and  $H_2: CO_2$  ratios were determined for fermentations in cucumber juice, dextrose, and 13 other carbon compounds.

These fermentation studies showed that: the optimum temperature was  $35^\circ C$ . with  $5^\circ$  and  $45^\circ C$ . as the minimum and maximum limits; the pH range in a buffered series extended from 4.25 to 8.85 with the optimum about 5.3; there was a progressive decrease in gas production as the salt concentration increased above five per cent saturation; the gas evolved from the fermentation of the various carbon compounds showed that the  $H_2: CO_2$  ratio depended upon the carbon source fermented.



Studies were made of the gaseous fermentation brought about by the Aerobacter in cucumber fermentations in 20, 40 and 60 per cent saturated brines. Results showed that the typical active hydrogen fermentation was usually produced in the 60 per cent brines while in the 40 per cent brines the active fermentation may or may not be produced. Small amounts of hydrogen may be produced in the 20 per cent brines or it may be entirely absent.

The gas evolution, as well as the composition of the gas, demonstrated that typical fermentations in both 40 and 60 per cent brines were divided into two distinct gas evolution phases; the first was brought about by the Aerobacter group and during the active period of fermentation the gas ratio of hydrogen and carbon dioxide was about 1 : 1; the second phase was brought about by the yeasts, during which period the gas was composed of practically all carbon dioxide.

A comparison of gas evolution from fermentations in 20, 40 and 60 per cent brines revealed that, in general, the fermentations at the higher salt concentrations resulted in larger quantities of evolved gas.

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## STUDIES ON INFLUENZA VIRUS

John B. Sarracino, Thesis (D.Sc.)  
University of Michigan, 1940

The studies which led to the ultimate proof that human influenza is caused by a virus were based on the earlier experimental work with swine influenza and canine distemper. Following the discovery and identification of the virus, it was found that the agent could be readily maintained by serial passage of infected lung tissue in mice, and such tissue has been the common source of infectious material for most of the experimental investigations.

In planning the present work, a strain of the P.R.8 virus was obtained and established in white mice in the usual way. During this procedure, two strains of Gram-negative bacilli were encountered as apparent contaminants in the lung tissues. Before discarding the cultures, it was believed best to investigate their possible relationship with human influenza virus in mice, in keeping with the well-known symbiotic action which exists between Hemophilus influenzae suis and the virus of swine influenza. Pure cultures of the organisms were inoculated into mice along with the P.R.8 strain; the germs were also superimposed on a sublethal virus infection which had been incubating for 48 hours. As a result of the first procedure, there seemed to be no change in the regular course of the disease; however, by the second method the bacteria in every instance augmented the severity of the infection resulting in the death of the mice. To obtain additional information, different groups of mice were immunized with the virus and with suspensions of the organisms. The virus-immune animals were protected against subsequent exposure of virus and germ; whereas, the bacteria-immune animals demonstrated little resistance to the test inoculum of virus and bacteria.



As is well known, age is an important factor in resistance to disease, and this was again brought out in the initial work essential to the maintenance of the P.R.8 strain in mice. Young mice are more susceptible than the older ones. With this information, a study was made of the influence of heat, cold, fatigue and alcohol on the influenza virus in mice. These factors seemed to play practically a negative role and therefore lead to an interesting theory relative to the infection in human beings. From observations recorded during epidemics and supported by the findings in this experiment, it seems that the appearance of influenza in an individual depends on the amount of virus and on the virulence of the virus rather than on the general resistance of the host.

The avenue by which the virus of influenza leaves the infected host has been envisaged generally as the respiratory tract during the act of coughing and sneezing. There are reasons to believe that this agent might find its way into the feces not only by the swallowing and survival of infectious material from the respiratory tract, but possibly by other means. Accordingly, a careful search was made of the virus in the feces of infected mice. It was essential to develop a technique for the handling of the feces which would destroy the ordinary microbic flora and preserve the virus. The recent work in which diethyl ether was used under similar conditions with the virus of poliomyelitis suggested the employment of this reagent. In preliminary studies, the P.R.8 strain of virus was found to resist 10 per cent diethyl ether for at least 90 hours. On the basis of these results, fecal specimens were collected from mice the third day following intranasal inoculation of the influenza virus. These were treated with 10 per cent diethyl ether at 5°C. for 36 hours. The ether was then removed and the residue instilled into the nostrils of mice. The lungs of the animals at autopsy demonstrated consolidations similar to those caused by the P.R.8



strain of virus, and by means of neutralization tests with known sera, the virus so isolated was identified.

Much time and effort were devoted to attempts to cultivate the P.R.8 virus on artificial media in the presence of living cells. Cultures of Gram-negative bacilli isolated from lungs of mice, bakers yeast (Saccharomyces cerevisiae) and pneumococcus, Type I, were inoculated with virus infected lung tissue, but no proliferation occurred; thus, more evidence was added to the relatively large accumulation of data that viruses have not been cultured, to date, in the absence of living tissues.

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Publication Number 327

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THE IMMUNIZATION OF ALBINO MICE TO BACILLUS  
TYPHI-MURIUM BY ORAL METHODS

Ruyu Frances Wang, Thesis (Ph.D.)  
University of Michigan, 1941

Although many claims have been made for the efficiency of oral vaccination, the adoption of this procedure as a prophylactic measure against enteric infections is still open to question. The present thesis is an account of an attempt to determine the value of this method in stimulating immunity in mice to a bacterial disease which simulates typhoid fever in man. A strain of B. typhi-murium, the etiological agent, which had been received from Dr. Topley, was selected for the study because of its virulence. The M. L. D. per os of this strain was approximately 8 million organisms, and several attempts to enhance the invasive power by serial passage were unsuccessful.

Five strains of mice, available in suitable quantities, were tested for their susceptibility to this infection and were found to be relatively resistant. In an attempt to lower the resistance of the animals such substances as ox-bile were given on several occasions prior to the introduction of the germs but the results were disappointing. Swiss mice bred for their susceptibility to the virus of rabies were ultimately selected and used in each experiment.

Mice of uniform age and weight with negative fecal cultures for members of the Salmonella group were vaccinated orally by means of a thin rubber tube attached to the needle of a syringe. The vaccine was prepared from organisms cultured on agar slants and then suspended in physiological saline solution and subsequently killed by heating for an hour at 55° to 60°C. Formalin was added to a final concentration of 0.25 per cent. The suspensions were standardized in the usual manner with a Hopkins tube. The concentration of the vaccine as well as the number and frequency of the inoculations differed in individual



experiments. As an aid in providing a more intimate contact between the germs and the cells of the digestive tract, dilutions of ox-bile prepared from desiccated oxgall were frequently introduced orally previous to the injection of the vaccine. The concentration of the vaccine as well as the number and frequency of the inoculations were varied.

Following the last injection of vaccine, and before the tests for immunity with living organisms were carried out, the treated mice were bled from the tail and the sera were titrated for the presence of specific agglutinins. No agglutinins were detected in the sera. The same animals were then given 8 to 80 million live organisms to evaluate any increase in resistance. Vaccinated mice exhibited a somewhat lower mortality than the normal controls.

To determine whether or not there was local antibody formation following the oral vaccination, the livers, spleens, and intestines of the treated animals were removed, extracted with saline and tested for the presence of agglutinins. The results were uniformly negative.

Finally, a comparison of two methods of vaccination was made. Groups of mice were treated by the oral route while others were vaccinated intraperitoneally. The sera were tested for the presence of agglutinins and immunity was determined by the feeding of the live organisms. The parenteral technique stimulated agglutinin formation but there was no superiority on the part of this method in provoking immunity.

While the results of the experiments were somewhat inconclusive, it was perfectly clear that oral vaccination aroused no untoward reaction and did confer protection to the same degree as the parenteral technique of administration. The data are to an extent tinctured by the lack of virulence of the test organism.

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## BIOLOGICAL CHEMISTRY

### A STUDY OF ANTIOXIDANTS WITH RESPECT TO VITAMIN A IN FISH OILS

Orson D. Bird, Thesis (Ph. D.)  
Michigan State College, 1941

A method has been developed for studying the stability of oils containing vitamin A. This method, designated as the induction test, consisted of exposing small, uniform samples of the oils to atmospheric oxidation at 37° C. under definite standardized conditions. The vitamin A-breakdown was measured either by frequent vitamin A assays, using the Vitameter, or by peroxide determinations. These two determinations could both be made on a single sample of 0.20 to 0.25 gm. of oil.

In developing this induction test several studies were made of the breakdown characteristics of vitamin A-containing oils when exposed to air. Relationships were established between the temperature to which samples were exposed and their area and depth. Results obtained with this simple induction test were as reliable as those obtained by using large samples and continually agitating them.

A correlation was established between the induction period of an oil, as determined by this test, and its stability under actual storage conditions.

This standardized induction test was employed in investigation of the comparative stability of a number of fish oils. These oils were obtained from several species and represented somewhat varied methods of preparation. It was found that the natural stability of these oils was influenced largely by the method used in processing them.

Conditions affecting the stability of fish oils were also studied. These included effect of diluent oils, presence of oxidation catalysts such as peroxides, acids, salts, and metallic soaps, and

presence of antioxidants. Numerous antioxidants were evaluated with regard to their protective effect. These included phenolic compounds, phospholipids, organic acids, tocopherols, various complexes, amines, and ammonia.

Studies were carried out to determine the nature of the natural antioxidants present in fish oils. These were made by subjecting the oils to various chemical treatments and evaluating the effects of these treatments on the antioxidants in the oils by means of induction tests. Several partially successful attempts were made at isolating from these oils fractions which contained the antioxidant or antioxidants.

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## CHEMISTRY

### A STUDY OF CYANAMIDE DECOMPOSITION IN SOILS

B. J. Birdsall, Thesis (Ph.D.)

Michigan State College, 1941

This investigation was undertaken to secure a better understanding of the soil conditions and constituents which affect the rate of decomposition of cyanamide and the nature of its decomposition products. Soils were treated with commercial cyanamid (one part cyanamid to 2000 parts soil) and maintained at favorable moisture conditions, extracted at suitable intervals and cyanamide and its decomposition products were determined. Various soil constituents and catalysts were also studied in solution cultures.

Cyanamide decomposed rapidly in acid Fox sandy loam (pH 4.3) through the urea and ammonia stages with nitrification retarded until the fifth week, after which nitrification proceeded normally. Nitrogen added as urea nitrified very rapidly in the presence of higher ammonia concentrations than occurred from cyanamide treatment. Ammonium sulphate failed to nitrify over a fifteen-week period in the Fox soil. Moisture contents of 5 per cent and 7.5 per cent, lower than the optimum content for the Fox soil (10 per cent), failed to reduce the rate of decomposition of cyanamide significantly. Liming the Fox soil to pH 6.1 and 6.9 slowed up the decomposition of cyanamide.

The rate of cyanamide decomposition was increased by reducing the pH of Wisner loam from 7.4 to 6.4 by means of sulphur treatments. An acid (pH 4.3) raw muck had a greater capacity to decompose cyanamide to urea and ammonia than a well-decomposed, high lime muck, pH 6.7.

Five lateritic soils, ranging from pH 4.9 to 6.4, low in organic colloids and with sesquioxide ratios near one, were active in decomposing cyanamide to urea and ammonia. Of a number of other soils studied, alkaline and neutral soils low in colloidal content, especially organic matter content, had a low capacity to convert cyanamide to urea. The removal of organic matter from five soils with varying capacity



to convert cyanamide to urea, by ignition at 325°C. for ten hours, destroyed their capacity to convert cyanamide. Extracted humus from four different soils at various concentrations exhibited no adsorptive or conversion capacity of cyanamide in solution cultures. Well-decomposed crop residues in an inactive soil effected no increase in the soils' capacity to convert cyanamide to urea and ammonia. Pretreatment for a few days with crop residues to the same and other inactive soils increased greatly their capacity to convert cyanamide to urea and ammonia.

Increased hydrogen ion concentration and removal of calcium by precipitation, in solution cultures, failed to increase the rate of cyanamide conversion to urea.

Reducing sugars were found effective in removing cyanamide from solution and permitted normal germination of wheat seeds at certain concentrations. The catalytic activity of the sugars was inhibited by acid media. The decomposition product proved to be primarily dicyanodiamide rather than urea.

Activated carbon was active in removing cyanamide from solution. The nature of the removal was adsorption of cyanamide rather than decomposition to urea.

The catalytic effects on cyanamide conversion of manganese, iron, aluminum and other compounds were studied. Manganese dioxide proved very effective in producing urea in an acid medium only. Potassium permanganate was found effective in an alkaline medium. Various other manganous salts were found relatively ineffective. Oxides of iron showed little or no effect. Of several ferrous and ferric salts of iron, only ferric carbonate showed a significant effect. Quinone, hydroquinone and quinhydrone proved effective in removing cyanamide from solution; however, urea was not the primary decomposition product. An effort to associate catalytic effects with oxidation or reduction produced by various treatments was not successful.

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## CHEMICAL AND IMMUNOLOGICAL PROPERTIES OF THE PROTEINS OF SILK

Norbert Harper Fell, Thesis (Ph.D.)  
University of Michigan, 1935

The important protein of silk, fibroin, has been studied chemically in an intensive manner, but its immunological properties have been neglected because of the usual conception that only soluble proteins can function as true antigens. However, fibroin, in common with other scleroproteins, can be dispersed in concentrated solutions of salts such as lithium bromide, and after dialysis fairly stable colloidal solutions can be obtained.

In this investigation some of the chemical characteristics of these fibroin sols have been studied, and immunological experiments have proved that the protein in this dispersed state was antigenic. It stimulated the production of antibodies in rabbits; the precipitin titer of some of the rabbit antisera was as high as 1:200,000. It would sensitize guinea pigs so that a subsequent injection of the fibroin sol produced fatal anaphylaxis. Dispersion of the protein in lithium bromide solution resulted in some slight hydrolysis or decomposition of fibroin, but the change was not marked, nor did it affect the immunological properties.

Degradation products of fibroin were prepared by partial hydrolysis with 70 per cent sulfuric acid at 30°C. for 30, 45, 60, and 75 minutes. From each of the hydrolysates insoluble products were isolated; all of these could be dispersed in lithium bromide solution. Those obtained after 60 and 75 minutes were almost entirely dialyzable, and the tyrosine percentage was significantly higher than in native fibroin. However, the products resulting from the shorter periods of hydrolysis formed colloidal solutions after dispersion in lithium bromide and dialysis; the tyrosine content was the same as that in the intact protein, and there was practically no free amino nitrogen. The data suggested that these fractions



might represent one (perhaps the crystalline) component of the fibroin molecule.

Some of the immunological properties of silk sericin also have been studied. This soluble protein became insoluble after it was subjected to the purification process employed. However, the resulting material could be dispersed in lithium bromide, and after dialysis, stable colloidal solutions were obtained. A soluble, diffusible sericin peptone also was isolated.

Fibroin and sericin functioned as specific antigens in the serological reactions investigated. Antisera produced in rabbits with one of these proteins would not cross-react with the other in precipitin tests. Fibroin hydrolysis products prepared from 30-minute hydrolysates did not give positive precipitin reactions with antifibroin-rabbit-serum. Possible relationships between silk proteins and allied materials originating in different countries were tested by cross-precipitin reactions involving fibroin and sericin antisera. The results indicated that there might be an "origin" specificity in silks.

The allergenic properties of fibroin, sericin, and fibroin hydrolysis products were studied in an individual known to be highly sensitive to silk. Purified fibroin and sericin produced typical allergic skin reactions. The products isolated after short hydrolysis with 70 per cent sulfuric acid at 30°C. caused more marked reactions than those elicited by native fibroin. Even the low-tyrosine peptones obtained by fairly prolonged hydrolysis produced definite reactions. A complete hydrolysate of fibroin had no effect on this allergic individual. The evidence indicated that the allergenic factor in silk might consist of a relatively simple combination of a few amino acids linked in a definite fashion; this nucleus might exist in both sericin and fibroin.

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## OPTICAL ACTIVITY OF SECONDARY BUTYL DERIVATIVES

H. P. Johnston, Thesis (Ph.D.)  
University of Missouri, 1941

Pure dextro secondary butyl hydrogen phthalate and the corresponding pure alcohol were prepared by the crystallization of the brucine salt of the inactive ester. Extraction with solvent at 0°C. of the brucine salt reduced the number of recrystallizations necessary to obtain the pure active component. Direct hydrolysis of the brucine salt in three molar base did not reduce the optical rotation of the active alcohol.

Levo 2-bromobutane was prepared from the dextro alcohol by saturation with dry hydrogen bromide at low temperatures.

The dextro secondary butyl hydrogen phthalate was hydrolyzed with a wide range of concentrations of both base and ester at two temperatures. The dextro secondary butyl alcohol which was recovered was not reduced in rotational power in any instance.

The dextro secondary butyl alcohol was treated with six, three and one molar potassium hydroxide at temperatures up to 96°C. for ten hours without any change in rotatory power. A solution of the sodium alcoholate in an excess of the alcohol was heated at elevated temperatures. The recovered alcohol was not impaired in rotation.

The levo 2-bromobutane was completely racemized in a 0.12 molar solution of sodium bromide in absolute methyl alcohol after forty-five hours at 40°C.

The quantitative rates of hydrolysis of the active ester and the levo bromide were determined. In the case of the bromide, the rate was unimolecular at low concentrations of base and inversion of optical rotation always occurred. The solvent used was sixty per cent ethyl alcohol.

Investigation of the use of the active phthalate ester as a means of measuring ester exchange was made. The effect of traces of water was to initiate side reactions of hydrolysis and catalysis. The quantitative measurement of these competing reactions made the use of the active ester unreliable.

The Walden inversion cycle between the dextro secondary butyl alcohol and the levo 2-bromobutane was carried out with potassium hydroxide, silver oxide, thionyl chloride and hydrogen bromide. The levo 2-bromobutane was hydrolyzed in an aqueous suspension of silver oxide at 30°C. The recovered alcohol was dextrorotatory. The levo bromide was hydrolyzed in a water solution of potassium hydroxide at 60°C. From this hydrolysis a dextro alcohol was obtained. The use of an alcoholic solution of strong base resulted in the complete formation of olefine compounds. The dextro alcohol recovered from each hydrolysis was treated in turn with hydrogen bromide and with thionyl chloride. In all cases a levo rotatory halide was formed. The alcohol was identified by the phthalate ester.

The substitution of the hydroxyl by a halide ion or the inverse reaction was always accompanied by an inversion of rotation. The inversion occurred in every case of negative substitution, regardless of the rate or concentration of reactants.

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THE REACTION OF PHENYL LITHIUM WITH DIARYL-  
AND TRIARYL-CHLOROMETHANES

Oliver F. Senn, Thesis ( Ph.D.)  
University of Michigan, 1941

Preliminary experiments indicated that the reaction between phenyl lithium and triphenylchloromethane resulted in the formation of an amorphous hydrocarbon of high molecular weight, which was probably obtained by polymerization of triphenylmethyl with elimination of hydrogen.

When an attempt was made to clarify the mechanism of this polymerization by treating the more simple diphenylchloromethane with phenyl lithium, pentaphenylethane was obtained in yields as high as 80%. Experimental evidence supported a mechanism in which a molecule of diphenylchloromethane reacted with a molecule of phenyl lithium to give triphenylmethane. This latter compound was then metalated by phenyl lithium to give triphenylmethyl lithium, which in turn reacted with a molecule of diphenylchloromethane to give pentaphenylethane. Application of this method to the formation of a series of p-bi-phenyl-substituted pentaphenylethanes gave very poor results.

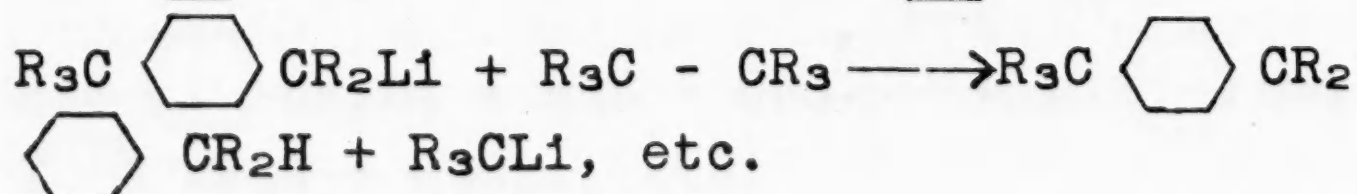
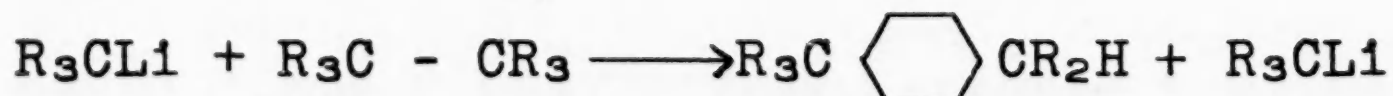
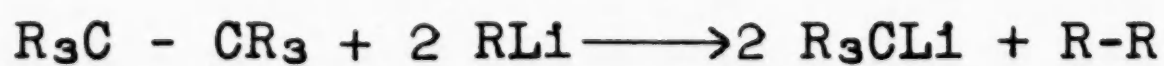
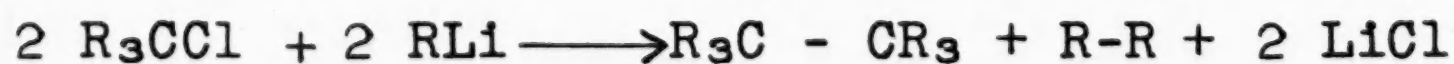
Attention was then turned once more to the product of the reaction between phenyl lithium and triphenylchloromethane. Similar products obtained by other methods have been reported, but no extended study was made of them. Analysis of the "polymer" showed a slightly lower hydrogen percentage than that in triphenylmethyl. This fact may be satisfactorily explained if one assumes a polymerization of the type found in p-benzhydryltetraphenylmethane. When carbon-hydrogen analyses were conducted on polymer fractions whose molecular weights had been determined, and due allowance made for loss of hydrogen in polymerization, satisfactory checks were obtained between

theoretical and actual analytical results. The empirical formula  $n(\text{C}_{19}\text{H}_{15}) - (n-2)\text{H}$ , where  $n$  is the number of triphenylmethyl units, was used successfully for calculations of carbon-hydrogen percentages.

When *p*-dimethylaminophenyl lithium was substituted for phenyl lithium in the reaction, the same polymer was obtained. Analysis failed to reveal the presence of nitrogen, thus showing that the phenyl group did not enter into the composition of the polymer, and that the phenyl lithium probably served only as a metalating agent.

When an exactly equivalent amount of phenyl lithium was added to an ether solution of triphenylchloromethane, excellent yields of triphenylmethyl were obtained. A slight excess of phenyl lithium brought about the formation of triphenylmethyl lithium, and a large excess caused the formation of the polymer. When triphenylmethyl was prepared from molecular silver and triphenylchloromethane and then treated with phenyl lithium, the polymer was once more obtained. These facts at once showed that the formation of the free radical was the first step of the polymerization, and that any mechanism involving the quinonoid form of triphenylchloromethane must be rejected. Similarly, mechanisms involving a quinonoid triphenylmethyl lithium must be rejected, since compounds of this type have been shown to exist only in the benzenoid form.

The mechanism finally adopted for the polymerization may be represented by the following series of equations in which  $R$  is a phenyl group.





Such a mechanism postulates the formation of p-benzhydryltetraphenylmethane, followed by metalation and subsequent reaction with hexaphenylethane. When p-benzhydryltetraphenylmethane was treated with phenyl lithium, the color typical of a triarylmethyl lithium compound was obtained, and after carbonation with solid carbon dioxide, only a small amount of the original compound was recovered, thus showing that metalation had taken place. Furthermore, when p-benzhydryltetraphenylmethane was treated with excess phenyl lithium, followed by an equivalent amount of triphenylchloromethane, the yield of polymer indicated that the p-benzhydryltetraphenylmethane had entered into the reaction. These experiments support the proposed mechanism for the formation of the polymer.

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## THE PREPARATION AND REACTIONS OF THE 1,3-DIMETHYL-4- AND 5-AMYL BENZENES

Orville Glenn Shanholtzer, Thesis (Ph.D.)  
University of Missouri, 1941

The eight 1,3-dimethyl-4-amylbenzenes were synthesized by methods which not only leave no doubt as to the position of the amyl group on the ring but also to the structure of the amyl group with the possible exception of the tert-amyl hydrocarbons. The methods used included direct alkylation of m-xylene by the use of tert-amyl alcohol in the presence of either boron trifluoride or 85% sulfuric acid, the reduction of the three 1,3-dimethyl-4-valerylbenzenes by the method of Clemmensen, and the use of Grignard reagents for the preparation of tertiary alcohols which were dehydrated and the resulting olefins were catalytically reduced to the corresponding 1,3-dimethyl-4-amylbenzenes.

Diacetamino and dibenzamido derivatives of most of the above hydrocarbons were prepared.

No satisfactory method is available for the preparation of the 1,3-dimethyl-5-amylbenzenes with the exception of the 5-tert and 5-normal isomers. The reactions between 3,5-dimethyl benzyl potassium or sodium and the butyl halides leads to products other than the 1,3-dimethyl-5-amylbenzenes.

The reaction between m-xylene and tert-amyl alcohol in the presence of either 85% sulfuric acid or boron trifluoride is not clean-cut. The product may be a mixture of the 1,3,4 and 1,3,5 isomers.

The reaction between decahydronaphthalene and the 1,3-dimethyl-4-amylbenzenes furnishes further evidence that the more highly branched the alkyl radical attached to the benzene ring, the more readily it is cleaved from the ring and eliminated as a paraffin hydrocarbon.



With the exception of the 4-neopentyl radical, those radicals which are attached to the ring by a primary carbon do not react with decahydronaphthalene to form a paraffin hydrocarbon.

The yields of mixed pentanes from 2-(2,4-dimethyl-phenyl) pentane and 3(2,4-dimethyl-phenyl) pentane were approximately the same (41%, 37%). When the secondary amyl radical is branched as in 2-methyl-3(2,4-dimethyl-phenyl) butane the time of heating is one and one-half hours as compared with four hours and the yields of pentanes is slightly higher (48%).

The 1,3-dimethyl-4-and 5-tert-amylbenzenes gave the highest yields of pentanes and required one and one-half hours to complete the reaction. The yields were 59% and 80%.

The tert-butyl radical in 1,3-dimethyl-5-tert-butylbenzene is as readily cleaved as the tert-amyl radical in the same position, whereas the 5-sec-butyl yields only a trace of butane.

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## EDUCATION

### THE SIGNIFICANCE OF VOCATIONAL CHOICES OF PHILIPPINE HIGH SCHOOL SENIORS

Deogracias Borlongan, Thesis (Ph.D.)  
University of Michigan, 1941

This investigation is a study of the significance of the vocational choices of Philippine high school seniors of the school year 1939-1940. Responses from 3406 seniors from three different curriculums--academic, general and home economics were included. These responses came from 36 public and private high schools widely distributed throughout the Islands. Items covered by this study include (1) the future plans of Philippine high school seniors; (2) the vocational choices popular among them; (3) factors influencing their choices; (4) motives behind these choices; (5) permanency of their vocational preferences; (6) sex, age, and regional differences in choices; (7) relationship between parents' occupations and seniors' choices; (8) relationship between seniors' choices and occupational opportunities in the country; and (9) the nature of the vocational guidance program in the Philippine secondary schools.

About 87 per cent of the seniors registered their vocational choices, and 13 per cent had not made up their minds as to their preferences. Seniors' choices were largely made in the seventh grade and in the third and fourth years of the high school. The choices showed a greater degree of permanency than is reported in American studies. A large percentage (60.22) of the seniors indicated they were planning to enter colleges and universities either immediately after graduation from high school or later; a considerable proportion (30.24) had decided to go to vocational schools; and a very small percentage (1.82) were looking forward to work immediately after graduation. About three-fourths of the seniors planning to pursue college work expected most of their financial support to come from their parents.



About one-half (52.41 per cent) of the seniors were influenced mostly by their parents in making their vocational choices. A small percentage (5.15) gave teachers credit for help in this matter. The motives behind their vocational preferences reveal unrealistic thinking and lack of contact with actual economic and industrial conditions in the Philippines.

The majority (85.2 per cent) of the seniors expect to pursue professional careers. Generally speaking, city and provincial seniors aspire to similar vocations. As might be expected, accelerated youth favor the professions, while the retarded favor commercial, mechanical and agricultural occupations. The percentage of seniors choosing the professions is overwhelmingly larger than the percentage of existing opportunities for that occupational group in the Islands. The seniors are desirous of attaining an educational level much higher than that of their parents. However, statistically computed, the seniors, particularly the children of professional parents, have a tendency to follow their fathers' occupations more often than can be accounted for on the basis of pure chance.

The only vocational services provided for are vocational information, personal data collecting, try-out courses and counseling. Findings reveal that even these have been very inadequately provided for. This study indicates great need for an adequate program of vocational guidance in Philippine secondary schools.

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A HISTORICAL STUDY OF NEGRO LAND-GRANT COLLEGES IN  
RELATIONSHIP WITH THEIR SOCIAL, ECONOMIC,  
POLITICAL, AND EDUCATIONAL BACKGROUNDS  
AND A PROGRAM FOR THEIR IMPROVEMENT

Oscar James Chapman, Thesis (Ph.D.)  
Ohio State University, 1940

I

HISTORICAL FOUNDATIONS OF THE AMERICAN  
SYSTEM OF AGRICULTURAL EDUCATION

It is the purpose of this section to trace in a broad outline the historical development of the American system of agricultural education in order to provide for the reader the necessary background to understand intelligently the full significance of the Morrill Land-Grant Act of 1862 and 1892..

II

ORIGIN AND EARLY HISTORY OF THE COLLEGES  
FROM 1862 TO 1900

Only a very brief mention has been made of Negroes and their relationship to the Morrill Act of 1862. It is the purpose of this section to consider more in detail the influence of the first Morrill Act upon Negroes, especially in the South, and to consider also the origin and enactment of the second Morrill Act of 1890, and the early history of the Negro land-grant colleges from 1862, when the first Morrill Act was passed, up to about 1900, when there was ushered in a period of general prosperity of American agriculture, which greatly influenced the growth and development of the colleges thereafter.



## III

## DEVELOPMENT OF THE COLLEGES FROM 1900 TO 1939

Some of the topics which are discussed in this section are: (1) the general agricultural conditions which favored the growth of the colleges from 1900 to 1914; (2) the relationship of the Federal Government to the development of the colleges, with particular reference to the Smith-Lever and Smith-Hughes Acts of 1914 and 1917, respectively; (3) the relationship of Federal subsidies to the field of operation of the colleges; (4) discriminatory practices of the southern states in the spending of both Federal and state funds on their Negro populations and thereby retarding the expansion and development of the colleges; (5) the retarding effects of the World War and the continuation of the development of the colleges thereafter, including a change in the curriculum and the development of short courses after 1920; (6) the development of college organization, physical equipment for the teaching of agriculture, home economics, and mechanical arts, college farms, and appropriate teaching methods and college plants since 1915; and (7) a brief survey of the colleges before the effects of the economic depression of 1929 had become pronounced; and (8) the growth of the colleges since 1929 as revealed from their status and current practices in 1939.

## IV

SOCIAL, ECONOMIC, POLITICAL, AND EDUCATIONAL  
CONDITIONS OF NEGROES OF THE SOUTH

In order to determine along what lines the work of the colleges should be directed, we here discuss briefly those phases of Negro life which center around the general status of his work, home, churches, health, and education, and carefully examine his restricted social, civil, ethical, and political rights, which have resulted from the dual organization of

southern society. This discussion of the present conditions of the southern Negro is both pertinent and necessary in order to show the part that this group of colleges should play in the improvement of Negro life in the South.

## V

A PROPOSED PROGRAM FOR THE COLLEGES IN THE LIGHT OF  
THE PRESENT CONDITIONS OF NEGROES IN THE SOUTH

A proposed five-point program for the colleges is advocated. This program in outline form centers around the following objectives: (1) the gradual elimination of the present system of farm tenancy and the establishment of a system of small farm ownership in its place; (2) the improvement of the training of Negro rural school teachers; (3) the improvement of farm and home life of the rural Negro; (4) the building up of a well-trained class of Negro tradesmen to serve the towns and cities, especially in the South; and (5) the introduction of strong movements for better relations between the races and the formulation of a constructive basis for racial understanding.

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AN ANALYSIS OF DATA CONCERNING FRESHMEN .  
ADMITTED TO WAYNE UNIVERSITY

Doris A. Cline, Thesis (Ed.D.)  
University of Michigan, 1941

College admissions data were analyzed in order to determine their value for the prognosis of academic success. The records of freshmen admitted to Wayne University for the year 1937-1938 under three different plans were studied. Of the freshmen included, 511 were admitted by certificate on recommendation of their high school principals, 34 were admitted by examination after having failed to meet the requirements for admission by certificate, and 141 were admitted without examination to the school of General Studies (a two-year program) because unable to enter the regular college work by certificate.

The data analyzed included age of the student, location of the high school from which he graduated, high school honor point average, principal's rating, health record, choice of vocation, rank on the American Council on Education Psychological Test, birthplace of parents, schooling of parents and occupation of father.

The percentage of success as measured by grades in academic subjects taken during the freshman year was 79 for those admitted by certification; 53 for those admitted by examination; and 62 for those admitted to the School of General Studies.

It was found that the student's honor point average in academic subjects during his four years in high school was the best single criterion of success in college during the freshman year. The coefficient of correlation for those admitted by certificate was 0.43 .037; for those admitted by examination, 0.10 .16; and for those admitted to the School of General Studies, 0.53 .03. Another criterion of value was the student's record in the general psychological examination, taken

when he entered college. A third criterion of value was the prediction of college success made by the student's high school principal and teachers. However, these predictions were more accurate for students who were rated above average than for those rated below average. As would be expected, students who were admitted at 16 years of age or under were more successful in freshman subjects than were those admitted at any other age.

The evidence obtained in this study indicates that birthplace of parents, occupation of father, education of father and mother, location of the high school from which the student was graduated, the student's choice of occupation and his health record had little if any value in predicting the student's success as a freshman either in the regular colleges of the University or in the School of General Studies.

In the matter of guidance of freshmen on the basis of the information now available concerning them, the study indicates that problems of personality and problems arising from the social and economic environment of the individual student should receive much more attention. A more extensive program along this line is necessary if the University is to meet its responsibility for the satisfactory adjustment of freshmen entering under present policies of admission.

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# TENDENCIES AS TO THE SCHOLASTIC SUCCESS OF JUNIOR-COLLEGE TRANSFERS AT UNIVERSITY OF MICHIGAN

Wray H. Congdon, Thesis (Ph.D.)  
University of Michigan, 1929

This study compared the relative scholastic success of three groups in the Engineering College of the University of Michigan. One group entered directly from preparatory schools; one group transferred from public junior colleges in Michigan; and the third group transferred to the University of Michigan from higher institutions of other types and locations. The study covered the five graduating classes of 1924 to 1928 inclusive, comprising 3,052 engineering students. Of this number, 258 came from Michigan public junior colleges, 755 transferred from other higher institutions, and 2,039 entered directly from preparatory schools.

The criteria of comparison based on the junior and senior years of study at the University of Michigan were as follows: a) grade averages by semesters; b) grade averages in a small group of subjects taken by all these students; c) disciplinary records for poor scholarship; d) economy of time in finishing the college course; e) persistency in residence; f) percentage of honor students in each group. The data were statistically handled according to accepted statistical methods, no differences in means being considered significant enough to justify conclusions unless they met the standards of "critical reliability."

So far as this study is indicative, the following conclusions are established.

1. Students entering the junior year of the Engineering College at the University of Michigan from junior colleges of the state have higher scholastic achievement than students who enter by other routes.

2. These junior college entrants maintain their scholastic superiority throughout their junior-

senior years of engineering college work. Although entrants by other routes steadily improve, they do not surpass the junior college group in scholarship as shown by point-hour ratios.

3. The junior college group has proportionately a much smaller number of students who are subjected to disciplinary action by the faculty because of their poor scholarship.

4. The junior college students do not suffer seriously in the matter of the time required to finish their course owing to the period of adjustment at the mid-college transfer point. Compared with transfers from higher institutions other than Michigan junior colleges, they are able to finish their course in a considerably shorter time.

5. The fact that this economy of time for the junior college group is effected simultaneously with the maintenance of superior scholarship records, shows that the junior college students are at a real advantage as compared with their classmates.

6. The junior college group graduates a considerably larger proportion of its fifth-semester entrants than does either of the other groups.

7. Of those students leaving college in their junior-senior years before graduation, the junior college group has a smaller percentage leaving with doubtful scholarship records.

8. A larger percentage of the junior college entrants receive graduation honors than is the case for either of the other groups.

The author will be glad to furnish a reprint giving a more complete summary of the study to anyone interested.

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## A SCORECARD FOR THE MECHANICAL ORGANIZATION OF JUNIOR HIGH SCHOOLS

H. L. Harrington, Thesis (Ph.D.)  
University of Michigan, 1930

A dissertation recently completed at the University of Michigan was concerned with the development of a scorecard for appraisal of the mechanical organization of junior high schools. The term mechanical organization as used in the study is defined as the "totality of measures by which the program of studies, the student body, the teaching staff, and the physical equipment are organized and interrelated in order that each may make its proper contribution to the carrying out of the aims and purposes of the school." The problem consisted (1) in developing a description of the ideal organization for a junior high school, consisting of a series of statements, each descriptive of one phase of such an ideal organization, and (2) in assigning to each of these statements a numerical value in proportion to its contribution to the ideal mechanical organization as a whole, 1000 points being arbitrarily selected as the score for the ideal type of junior high school organization.

In order to secure the statements descriptive of the elements of the ideal mechanical organization, the following steps were taken: first, the literature bearing on the subject was critically examined by the author and a formulation of items was made as the result of this examination; second, this list was enlarged by adding items found in three other formulations made independently by three junior high school principals; and third, this extended list was submitted for criticism to 13 college teachers of education, to 19 superintendents of schools and other central administrative officers, to 17 administrative officers in high schools, and to 45 administrative officers in junior high schools. As a result of the suggestions made by these critics a scorecard of 51 items was established.

Values were assigned to the items of the scorecard by a similar technique. The 51 items were submitted to about 350 persons engaged in junior high



school administration or closely allied work throughout the country, with the request that they distribute 1,000 points among the items in accordance with their judgments of the relative importance of the items. From the 138 sets of judgments received, a median value for each item was calculated; and these values, with slight arbitrary adjustments, were assigned to the items of the scorecard.

The resulting values for the major divisions of the scorecard are: program of studies, 260; student body, 310; teaching staff, 200; physical equipment, 115; and administration of mechanical organization, 115. A synopsis of a few of the items under "Student Body" should serve to illustrate the nature of the scorecard. The numbers following the items are the arbitrarily "perfect" scores: Pupils should be grouped homogeneously in required subjects, 15; pupils should be grouped by physical development in physical training classes, 7; pupils should be grouped by sex in sex-differentiating subjects, 9; promotion should be by subject, 20; for economy, recitation sections should be kept up to the size adopted as the standard, 15; for efficiency, recitation sections should be kept down to the size adopted as the standard, 15; the same teacher should teach a section every time it meets, in any subject, 10; a recitation section in a subject should always meet in the same period, 4; in any subject, a section should recite only once per day, unless scheduled for more than five recitations per week, 5; double periods should be provided where indicated by the program of studies, 5; work-study-play alternation should be provided in the schedule of all groups, 4; in assigning rooms, long walks through corridors and up and down stairs should be avoided, 3; all groups should be assigned to a proportion of better than average teachers, 5; transfer of pupils from one curriculum to another should be provided for, 25; and so on.

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# SEVENTH-GRADE FREE-READING--ITS RELATION TO CERTAIN PERSONAL AND ENVIRONMENTAL FACTORS

Vest C. Myers, Thesis (Ph.D.)

University of Missouri, 1940

This study of the time spent in free reading by a typical group of seventh-grade children, 1225 in number, had four principal objectives: (a) to determine the total time spent in free reading; (b) to determine the time spent in reading different types and kinds of materials; (c) to study the relationship between the quality of the material read and the opportunities which the environment presented, and (d) to study the relation of the time spent in reading to certain personal and environmental factors.

A self-kept information sheet, prepared especially for this study, indicated the daily reading time and the kind of materials read for a thirty-day period. School records and tests administered by the investigator furnished additional personal information. Data concerning home conditions and activities were supplied by the pupils on a special form provided for their use.

The chief findings of the study may be summarized as follows: (1) The average time spent in free reading by each pupil was forty-five minutes a day. (2) Newspaper reading was the favorite type, although it exceeded book reading by a very narrow margin. (3) Fifty-nine per cent of the free reading time was spent on news in the newspapers, comics and jokes in the newspapers, and adventure stories in books. (4) Less than one per cent of the total reading time was spent in reading poetry, Bible stories, school news and the children's page in the newspapers. (5) Pupils who enjoyed a private study room at home gave 15.5 per cent more time to free reading than others who read and studied in a common reading room. (6) Pupils from schools rated as "superior" showed higher median scores in intelligence and in reading ability, and a lower median chronological age. They spent less time in free reading than did pupils from the "inferior" schools. (7) Children with



eyesight rated as good averaged fifty per cent more time in free reading than did the children with "poor" eyes. (8) The home and the school library furnished nearly 80 per cent of the magazines read. Fifty per cent of all the books used in free reading came from the school libraries. The public libraries furnished approximately 20 per cent of the books read. (9) A coefficient of correlation of .701 between the pupils' reading scores in standard reading tests and their intelligence quotients indicates a high positive correlation between these variables. (10) In the study of the quality of the books read by the two groups of children, it was found that the children of the "superior" schools spent 20.4 per cent more time in reading books of superior worth than did the children of the other type of school. (11) In terms of reading time the boys rank newspapers first, books second, and magazines third, while the girls rank books first, newspapers second, and magazines third.

Finally, a few matters may be seen in sharp relief as a result of an over-view of this study:

(a) The proximity of reading material is a large factor in determining what the child will read.

(b) Free reading seems to be universal among seventh-grade children. No child in the present study failed to do some free reading.

(c) The reading interests of seventh-grade children seem to be specific rather than general, implying a somewhat spotted development and suggesting the need for an attempt on the part of the schools to systematically build up wider interests in reading.

(d) Children from the better schools might well spend more time in free reading. They are clearly not living up to their full possibilities in this regard.

(e) The school and the home have a definite responsibility in the creation of an environment which will both directly and indirectly cause the child to associate with newspapers, magazines, and books.

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STUDENT PERFORMANCE  
IN A MUNICIPAL COLLEGE

Preston H. Scott, Thesis (Ph.D.)  
University of Michigan, 1933

The purpose of this study was to present an analysis of student performance at the College of the City of Detroit (now Wayne University). The intelligence levels were used as bases of comparison. Scholastic achievement in terms of honor-point average was statistically compared with extracurricular activities, work for wages, sex, and personality traits. Other factors, such as home duties, off-campus activities, recreation, physical disabilities, choice of life work, reasons for choice of life work, relation of life work choice to work for wages, desire for vocational information, residence, and nationality of parents were discussed from the viewpoint of student distribution and intelligence trends.

The study was limited to the matriculated day students enrolled in the liberal arts college of Wayne University during the second semester of the academic year 1930-31. The total number of students enrolled was 2312; of these 57.5 per cent were men and 42.5 per cent were women. The number used in this study was 1703, or 73.6 per cent of the total. Of these, 759 were freshmen, 506 were sophomores, 252 were juniors, and 150 were seniors. Thirty-six were unclassified but were distributed among the freshmen and sophomores after an examination of their programs.

The information was secured (1) by submitting a questionnaire to the students, and (2) from records available in the registrar's office. Filling out the questionnaire was not compulsory. Following two weeks of explanation in the Wayne University newspaper, students were asked to come to various rooms where previously trained directors submitted the

questionnaire to them. The intelligence test of the American Council on Education, Series 30, was used. Inserted in the questionnaire was a Self-Rating Personality Chart, devised by the author for obtaining data concerning the introvert or extrovert tendencies of the students.

The data were classified, and transferred from the questionnaire to cards, each containing the history of the individual case. Using intelligence as a basis for classification the group was divided at quintile points. The case data were then transferred to five charts, each chart containing a composite picture of the data in each subgroup.

The analysis of the data indicated certain trends which, when considered in the light of the whole study, were significant enough to permit the following deductions:

1. Community interest off-campus engaged more students than did the campus activities, the percentages being approximately 72 and 44.
2. Campus activities were chiefly of two types, social and athletic. The number of students who participated in other types of activities was very small.
3. A larger percentage of students who participated in campus activities was representative of the higher social economic group.
4. There was a positive relationship between participation in campus activities and academic achievement.
5. For the most part students who were engaged in neither wage earning employment nor campus activities tended to do poorly in scholastic work.
6. In the analysis of introvert and extrovert tendencies it appeared that the extroverts were more inclined to participate in campus activities, but that the introverts who did participate tended to have superior scholastic records and to be more stable.
7. Students who participated in activities of an intellectual character tended to have higher scholastic achievement than those participating in the social, athletic, musical, and dramatic activities.



In conclusion it may be stated that while intelligence plays a part in student performance, the correlation among intelligence, scholastic achievement, participation in campus activities, and work for wages is low. No correlation among other factors considered was found.

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THE STRUGGLE ABOUT STATE AID TO VOLUNTARY  
ELEMENTARY SCHOOLS IN GREAT BRITAIN

Henry Van Zyl, Jr., Thesis (Ph.D.)  
University of Michigan, 1931

Here the spotlight of research is cast in the direction of State support of that private initiative which ever since the middle of the seventeenth century founded and controlled its own elementary schools in Great Britain. Several groups of parents and friends hostile to Erastian principles of State supremacy in matters educational, and equally opposed to Church domination of education tenaciously fought for freedom to establish their own Voluntary Schools and ever since 1833 to receive annually grants of money from Parliament.

Their insistence to work out their own problems of education in their own elementary schools, first against the monopolizing control of the Church of England and later against the exclusive State idea of control and support, naturally implied a long and arduous struggle.

In the first phase of this struggle from 1660 to 1870, the Voluntary Schools scored a victory against the Church; the second phase lasted from 1870 until 1902, the memorable year when Parliament by law voted practical equality between State schools and Voluntary Schools in the matter of State support.

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## GAME

### THE USE AND CONSERVATION OF MINNESOTA GAME 1850-1900

Evadene Burris Swanson, Thesis (Ph.D.)  
University of Minnesota, 1940

Wild animals, once considered a valuable resource only in the wilderness or on the fringe of settlement, in fact contributed to man's welfare long after frontier days were over. Eventual recognition of their economic and esthetic value and of the possibility of their survival led to the development of a conservation program supported by federal, state, and private organizations. Indians and white traders had sought Minnesota furbearers since the seventeenth century, and explorers, missionaries, and travelers alike depended on game for food and sport.

After the Indian treaties of 1851 opened large areas of Minnesota for farming, towns and villages multiplied, and the wilderness aspects of southern, central, and western regions were obliterated, though much of the northern border area retained its primitive character, suffering somewhat from the inroads of logging companies. In the years after 1850 Minnesota wildlife was becoming adapted to settlement.

The extent of the fur harvest in this period can only be estimated by reports in local newspapers and by the records of raw fur companies flourishing in the Twin Cities. One of the leading firms, the Joseph Ullman Company of St. Paul, was founded in 1854. This company expanded rapidly and in 1875 its owner moved to Leipzig, the European fur capital. The St. Paul office was then only one of scattered branches, but its importance in the trade is evidenced by the company records, many of which have been preserved. Ambitious farmers supplemented their earning from agriculture by trapping in the winter. Buyers traveling throughout the countryside collected skins in rural areas.

Market hunting was another commercial field exploiting Minnesota's game. In the 1850's and 1860's venison, ducks, prairie chickens, and grouse were considered a welcome but incidental addition to the pioneer larder. After 1870 the export trade was aided by improvement in transportation and refrigeration. Alexandria, Sauk Rapids, Fergus Falls, Moorhead, Detroit Lakes, and Litchfield were important points of shipment and in the last decade of the century Park Rapids, Bemidji, Duluth, Roseau and other towns in northern Minnesota had considerable traffic in game. Restaurants and hotels often specialized in game menus. Lumber camps depended heavily on big game for an inexpensive meat supply. Itinerant hunters followed the birds in migration taking large bags in spring and fall. Nesting colonies of passenger pigeons attracted these men in the 1860's and 1870's. Chippewa Indians living on reservations in the northern part of the state hunted for the market receiving ridiculously low prices for venison and grouse much in demand in New York and Chicago. Federal reports of Indian agents give some indications of the abundance and scarcity of game at different points in the north.

In addition to the depredations of commercial hunting and trapping wildlife was subjected to further pressure by lumbering and drainage activities. Large herds of bison were already gone from Minnesota by 1850, but other species of big game suffered from settlement, especially elk and caribou. The white-tailed deer on the other hand increased its range spreading into parts of northern Minnesota where they had not existed in 1800. Passenger pigeons disappeared entirely and sandhill cranes, whooping cranes, and trumpeter swans became rare species by 1900.

Several new game birds appeared, the pin-nated grouse replacing the earlier resident, the sharp-tailed grouse in the southern part of the state, and the bobwhite quail becoming a resident of southern and central Minnesota.



Legislative action to protect wildlife began even in territorial days. Restrictions on methods of hunting and trapping were formed and market hunting was condemned even in 1871, but official provision for law enforcement was not made until 1890. In the last decade of the century a vigorous effort to stamp out market hunting was led by Samuel Fullerton, the executive agent of the state Game and Fish Commission.

Sportsmen's clubs of early days often sponsored competitive hunts and contests in shooting. Some clubs adopted law enforcement as one purpose also, and became part of a powerful group pressing for the abolition of market hunting. When federal law supported the state statutes by prohibiting game shipment as part of interstate commerce in 1900, conservation had won its first great battle and opened the way for progress in the twentieth century.

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## GEODESY

### CONCERNING THE STRENGTH OF FIGURE FORMULA IN TRIANGULATION

C. G. T. Stipe, Thesis (Ph.D.)  
University of Michigan, 1939

Though the "strength of figure" formula

$R = \frac{D - C}{D} \sum [\delta_A^2 + \delta_A \delta_B + \delta_B^2]$  had been used in better practice in triangulation for some time, there apparently was relatively little background for its development. It was thought that a theoretical discussion of it would be of material benefit in furnishing a historical background for the geodetic work in this country. Hence, this paper was to be concerned with a theoretical investigation of its development by the use of least squares, and a discussion of its use in its present form.

In a triangulation net, the base line is assumed to be exact, and the frequency of additional base lines is dependent on the accuracy of the angle measurements and on the "strength of figures" employed in the triangulation. In deciding which of several possible triangulation schemes to adopt it is important to inspect the different chains of geometric figures with a view to ascertaining which is the "strongest"--that is, which one will, with a minimum of check bases, give the calculated length of the final line with the least error due to shape of the triangles and the composition of the figures.

To that end, in a triangulation net, with a single measured base, in which the sides are to be computed from this base through the intervening triangles, it was assumed that the contradiction among the measured angles had been removed and a consistent figure obtained by adjustment of the angles so as to satisfy the two classes of conditions: (1) Those arising at each station from the relations of the angles to one another at that station. These are



known as local conditions. (2) Those arising from the geometrical relations necessary to form a closed figure--(a) that the sum of the angles of each triangle in the figure should be  $180^\circ$  increased by the spherical excess of the triangle. (b) that the length of any side as computed from the base should be the same whatever route is chosen. These are known as general conditions.

The aforementioned assumptions having been made, the mean square error of the logarithm of the computed side in a chain of triangles was computed by the method of least squares. It was at once evident that this resultant equation was too cumbersome, even for a small number of triangles in a chain. To alleviate this condition, the mean square error of the adjusted angles was replaced by the average mean square error of all the adjusted angles. This assumption gives nearly the same results, and well within the limits specified by the Board of Surveys and Maps of the Federal Government Specifications for Horizontal and Vertical Control.

When the horizontal angles of a triangulation net are obtained by use of the so-called "direction theodolite" the angles are not determined separately; rather, the directions of the signals are sighted and read and the angles are obtained from the differences in direction. Since two directions are read to determine each angle, the average mean square error of the observed angles was replaced by the average mean square error of the observed directions by a proper substitution. Finally, by taking cognizance of the relation between the mean square error and the probable error, there results an equation which states that the square of the approximate probable error in the logarithm of the computed side in a chain of triangles is

$$\text{angles is } \frac{4}{3} d^2 \left( \frac{D - C}{D} \right) \Sigma [\delta_A^2 + \delta_A \delta_B + \delta_B^2].$$

Upon

Upon examination it is noted that this quantity is composed of a constant,  $4/3$ ; the average

probable error of an observed direction,  $d$ ; a factor which depends on the nature of the figure chosen,

$\frac{D - C}{D}$ ; and a quantity which depends on the shape of the triangles which constitute the chain in a single figure in the triangulation net,  $\Sigma[\delta_A^2 + \delta_A\delta_B + \delta_B^2]$ .

It is evident that the first two quantities are not concerned with the shape and nature of the figure chosen, and that the last two are independent of the precision with which the directions are found. Hence, the so-called strength factor,  $R$ , or the "strength of figure" formula is taken as

$$R = \frac{D - C}{D} \Sigma[\delta_A^2 + \delta_A\delta_B + \delta_B^2].$$

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## GEOLOGY

### THE EFFECT OF CERTAIN WETTING AGENTS ON THE WATER INTAKE AND ERODIBILITY OF SOILS

Thomas Hampton Thornburn, Thesis (Ph.D.)  
Michigan State College, 1941

Soils were treated with commercial wetting agents, both in the laboratory and in the field to study their moisture relationships. These wetting agents, which are soap-like compounds, usually containing sodium, were found to affect wetting properties, capillary rise, percolation rate, and moisture retention of soils when studied in the laboratory. The results obtained were not consistent for all classes of soils tested, but the reagent treatment apparently increased the permeability of some sandy loams. It was noticed that after considerable percolation had taken place the permeability of the treated soil samples decreased. Whether this was the result of gradual leaching of the wetting agent from the soil or of dispersion of the soil colloidal material, it was not possible to ascertain.

From field erosion plots established on sandy loam soil in three different locations data were collected covering two summer seasons for two sets and one summer season for the other set. Measurements were made of the amount of run-off water and eroded soil, and on one set the moisture content within the soil was determined regularly. The effect of the incorporation of exploded, untreated wood fiber into the soil was also studied.

The wetting agents were found to lower the run-off from erosion plots as much as 50% with soil losses reduced a comparable amount. However, little difference was found in erosion losses from sandy loams with a fairly heavy subsoil whether treated or untreated. Indications were that the treatment lost its effectiveness in the period of one year, but water intake was increased by retreatment with the reagent.

The addition of a relatively large amount of the wood fiber was found to reduce erosion losses. This was due to the increased porosity of the soil and to the formation of a soil-fiber mulch which retarded surface run-off. Soil losses were rendered almost negligible after the formation of this mulch.

The wetting agents are concluded to be responsible for three actions: (1) increased rate of wetting of air-dry soil particles, (2) lowered surface tension of water in contact with the soil and, (3) dispersion of the soil particles. Increased rate of wetting prevents immediate run-off when precipitation starts. Lowered surface tension of the water allows it to percolate through the soil more rapidly, and by decreasing capillary attraction reduces evaporation losses. The dispersion of the soil particles is an action of the reagent which is constantly tending to counteract the other two effects. With the light textured soils tested in the field, dispersion was not an important factor, and in no case did moderate treatment with the reagent increase erosion losses during the season in which it was applied. However, with heavier soils this action of the agents must be given serious consideration.

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## HISTORY

### THE CUBAN QUESTION AS REFLECTED IN THE EDITORIAL COLUMNS OF MIDDLE WESTERN NEWSPAPERS 1895-1898

George Washington Auxier, Thesis (Ph.D.)  
Ohio State University, 1938

A number of studies have been made during recent years on the influence of American newspapers in precipitating the Spanish-American War. These studies, however, have been too restricted as to area to justify the generalizations ventured or to show the true relationship between press opinion and the causes for the declaration of war.

It has been, therefore, the purpose of this dissertation to show this relationship for a large and important area--the Middle West. The editorial columns of more than forty of the region's leading journals were analyzed for the period 1895-1898. The analysis covered approximately 10,000 editorial pages and yielded more than 5,000 pertinent editorials. From this bewildering wealth of material an effort has been made to reconstruct the attitude of Middle Western newspapers toward the Cuban question and to indicate its probable influence in bringing about American intervention in 1898. In presenting the results an effort has been made to treat press opinion within the framework of related political and diplomatic events. This naturally involved the utilization of all government documents covering the period.

Although it is difficult to make generalized statements regarding the exact influence of the Middle Western newspapers in bringing about the Spanish-American War, their editorial comment would seem to indicate that they contributed to that end. Their chief influence, however, was not effected through sensational journalism--as the studies previously made have assumed--but rather through continual emphasis on a number of basic factors which led to war. These factors were: the fundamental interests of the

United States in the Caribbean, Spanish violations of these interests, propaganda activities of the Cuban Junta and the implications of the Cuban question in the domestic politics of the United States.

This study of the influence of Middle Western newspapers in bringing about the Spanish-American War suggests that a definitive interpretation of the relationship between the war and American newspapers must wait until an analysis of newspaper opinion has been made for the entire country.

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THE MORALE OF CONTINENTAL AND MILITIA TROOPS  
IN THE WAR OF THE REVOLUTION

Benjamin Allen Bowman, Thesis (Ph.D.)

University of Michigan, 1941

This investigation was undertaken in order to ascertain the state of patriot morale in the army at various periods of the American Revolution, the causes of fluctuation in fighting spirit, and what efforts were made to maintain morale; also to discover what problems of army discipline existed and what relation they bore to morale. The study covers all the important American armies that were put into the field, and utilizes a wide variety of manuscript sources (including the Nathanael Greene Papers, military journals, orderly books, army correspondence, etc.), as well as the printed materials.

The investigation reveals how morale was determined by such physical factors as the poor quality of many soldiers, the precarious nature of army supplies, health problems, and inadequate wages, and by such psychological factors as the feeling of inferiority to British regulars, the prospect of foreign aid, the provincial character of patriotism, and a fierce love of liberty. Discipline was lax because of the prevailing passion for liberty, because of the difficulty of securing enough recruits, and for other reasons; but insubordination did not always impair morale. Fundamental disciplinary problems were unsolved throughout the war, and morale showed wide fluctuation until the battle of Yorktown.

A careful examination of the militia problem indicates that the use of irregular troops seriously undermined both discipline and morale. Militia, however, contributed in a limited way to final American success through their adaptability to guerrilla warfare. Special attention is given to desertion, its causes and extent, and the failure of civilian

and army officers to prevent it. The mutinies, both major and minor, also receive special treatment.

The study reveals that efforts to maintain morale were largely unorganized, but that officers' influence and the clever use of propaganda were particularly effective. A brief concluding section summarizes succinctly the important results of the investigation.

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AN ECOLOGICAL STUDY OF CHINA FROM  
SEGMENTATION TO INTEGRATION

Ch'eng Hsin Chao, Thesis (Ph. D.)  
University of Michigan, 1933

China is undergoing a series of tremendous cultural changes. The dominant trend of these changes may be characterized as being one from segmentation to integration. While forces within may have contributed to these changes in contemporary China, it is the group of forces from without which have been largely responsible.

In this study the two processes of segmentation and integration are analyzed from the point of view of human ecology, that branch of social studies which deals with the sustenance and place relations of human society. Cultural changes, viewed ecologically, find external expression in changes in the spatial pattern and the symbiotic structure, that is, in the rearrangement of population and in the reorganization of structure and form in the community. On account of methodological necessity, China may be divided into regions of accessibility with reference to the industrialized West.

In order to understand the process of population aggregation, a chapter is devoted to factors in the biotic equilibrium, regional distribution, urban aggregation, foreign population in China, expansion and migration, and Chinese abroad who may still be said to be factors in Chinese symbiotic relationships.

The segmentary pattern of China is characterized by the village-town aggregations and rudimentary inter-community exchange, the inefficient means of communication and transportation based largely on human and animal energy, and barriers to the movement of goods such as local transit duties, confusion in monetary and weight systems, diversity of dialects, banditry, and military strife.

The key to the change from segmentation to integration is the cultural contact of China with the industrialized West. The coming of the out-groups has been correlated with changes in ocean-transportation and world-wide system of telegraphic communication. China's response to the impact of foreign culture has been characterized by the sending of students abroad and the development of schools at home along the line of those in occidental countries.

Responses to cultural contact include also the development of mechanical means of transportation and communication, the establishment of a national postal system, and the general process of industrialization. These responses may well serve as indications of the emergence of a new ecological order. A necessary consequence of these new developments is the rise of metropolitan communities particularly in regions with easy access to the culture of the industrialized West.

China is becoming increasingly integrated into the world community. Whatever changes may occur in the world community will be felt in China. In these changes China will have to find the methods of integration which are necessary for her survival.

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## JOURNALISM

### THE NEWSPAPER AS A RECORDER OF CONTEMPORARY HISTORY: A CASE STUDY OF THE REPORTING OF THE FRENCH OCCUPATION OF THE RUHR IN THREE AMERICAN NEWSPAPERS

DeWitt Carter Reddick, Thesis (Ph. D.)  
University of Missouri, 1940

Purpose: To analyze the material concerning the Ruhr printed in 1923, 1924, and 1925 in The New York Times, The St. Louis Post-Dispatch, and The St. Joseph (Mo.) News-Press; to determine through this analysis the pattern followed by foreign news reporting at this time and thus to arrive at a clearer conception of the nature of foreign news, its limitations and its strong points; and finally, to test the truth of the statements in the news stories by weighing them against official records now available.

Procedure: Three basic classifications were made of the Ruhr material in each newspaper, and each class of material was checked by certain tests. The classifications were:

1. Explanations and interpretations concerning the cause of the occupation.
2. "The basic framework of the news"--that is, those statements of daily events in the Ruhr reported as statements of fact as distinguished from statements of opinion or interpretation.
3. Interpretative or speculative material concerning the execution of the occupation, including all material (exclusive of that belonging under the first classification) which was reported not as fact but as a quoted statement from a given source, a rumor, a prediction, interpretation, or comment.

Findings: All three papers took definite editorial stands. The Times wholeheartedly supported the French action. The Post-Dispatch just as ardently sympathized with the Germans. The News-Press felt that both sides were at fault. All three papers, however, freely printed articles that contradicted their

own editorial views, thus showing a willingness to permit expressions on various sides of the question.

The Times, editorially in support of the French, printed three times as much material from Paris as from Berlin. The Post-Dispatch, editorially in support of Berlin, gave almost twice as much space to Berlin as to Paris. The News-Press devoted a proportionately large space to comments and opinions from Washington.

Statements of fact, printed as such rather than as quoted interpretation or speculation, constituted about 25 per cent of the Ruhr material in the Times, 40 per cent in the Post-Dispatch, 50 per cent in the News-Press. Checked against authentic records, these statements proved to be better than 90 per cent accurate.

In the interpretative and speculative material, constituting the bulk of the Ruhr matter in the papers, a high degree of inaccuracy was found. Much of the material in each material was contradictory, as might be expected when opposing sources are quoted. Such material, however, was for the most part plainly labeled as to source and nature, so that the discriminating reader might be enabled to accept material in the light of the source.

A detailed analysis of all the Ruhr material is given in the dissertation.

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Evelyn Steel Little, Thesis (Ph. D.)  
University of Michigan, 1936

The purpose of this study is to provide librarians and teachers engaged in the practice of book selection with a critical guide to English translations of Homer and Theocritus in which the emphasis is placed upon the needs of the general reader who knows no Greek, but desires some acquaintance with two of the great classical poets. It is based upon a careful examination and comparison of 186 English editions of Homer and 49 of Theocritus, appearing between the years 1470 and 1935. The responsibility for selecting and providing the reading public with adequate translations of all great books rests squarely upon the librarians, among whom few will be equipped to choose with knowledge of the originals in many languages. Critical opinions based upon study in respective fields should therefore be exchanged.

The study shows that while faithfulness is the essential quality in the art of translation, there is wide variation in the fidelity which almost every translator claims as his chief virtue, whether he is faithful to substance or to form; that fashions and standards in translation naturally change with styles in literature from one age to the next, so that there must always be new translations for successive generations in terms of their own speech and literary canons.

A survey of the English versions of Homer over a period of three hundred and fifty years is the best indication of changing public taste in the styles of translation, since no other poet has been so continuously translated. The translations of Theocritus over the same period, though too few in number to justify conclusions in themselves, show the same tendencies, viz., a progressive change toward greater elasticity in form, from rhymed couplets, to blank

verse, to prose; an increasing emphasis on the translator's obligation to report faithfully the veritable substance of his author.

The list of titles here presented, with extensive comments and illustrative quotations, excludes interlinear translations designed as tutorial aids, fragmentary versions, and adaptations for children, which are too abridged to be counted as translations. With these exceptions, the bibliography is inclusive, but the editions recommended are selective, with respect to the fidelity of the translation, based upon a comparison with the original Greek, the aesthetic quality of the English version, and the typographical features of the available editions of the work in question.

No consistent effort has been made to indicate the location of editions ordinarily available, but for rare works this is noted as a convenience to scholars. A general division has been made under each author, between complete and partial versions, and in each section the translations are listed by date. An alphabetical index of translators furnishes the key to any particular version wanted. A chronological chart of all translations, divided by form, indicates the volume of publication and changing of styles in translation through three and a half centuries.

The study concludes that there is of Homer or Theocritus no one best English version, but there are available several excellent ones each with its own qualities. The secret of reaching any appreciation of a foreign poet through the medium of translation is to read as many versions as possible. In this way the total impression becomes that of certain elements constant in all of them, due to the original. Such a composite portrait may have its own deficiencies in lack of definity outline, but it is truer than a distorted view from the single angle of one translator.

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## THE IDEA OF THE RENAISSANCE FROM PETRARCH TO HALLAM

Herbert Weisinger, Thesis (Ph.D.)

University of Michigan, 1941

The purpose of this thesis is to discover the origins and to trace the development of the idea of the Renaissance from Petrarch to Bacon in continental and English materials and to follow this idea from Bacon to Hallam in English literature.

The concept of the Renaissance is a humanist invention. Writers of the Renaissance thought of the age in terms of a complex of ideas and held the belief that there was a difference between their period and the past. Innovators such as Petrarch and Cimabue were named, dates ranging from 1395 to 1599 were set as marking the beginning of the Renaissance, and the activities which constituted the Renaissance were described. The courses of the Renaissance of the Fine Arts and of the Revival of Ancient Learning were traced by them, while the relationships between the Renaissance and previous and contemporary movements, the Middle Ages, Nationalism, the Reformation, and the Rise of Science were established. The pattern which subsequent theories of the Renaissance followed was laid down in the Renaissance itself. The Renaissance emphasis on the humanistic, secular, and scientific aspects of Renaissance activity demonstrates the unsoundness of Burdach's thesis.

In the period from Bacon to Hody in England, attention was given to the Revival of Ancient Learning and of the Fine Arts, to the establishment of the reputation of the Elizabethans, and to the connections between the Renaissance and the Middle Ages and the Reformation, but the most significant writing was centered on the rise of science as marking the division between the modern era and the past. In this connection, Bacon was both a source of ideas and a symbol of the prestige of science. The up-

holders of the authority of the ancients and of the idea of decay were first crushed, and then the superiority of the moderns, based on the technological and ideological improvements made by the new sciences, was established. Thus the idea of the Renaissance became part of the controversy between the ancients and moderns and established connections with the rise of science and with the idea of progress.

The last two chapters deal with the idea of the Renaissance from Hody to Roscoe, and from Roscoe to Hallam, the first Englishman to write a full-length study of Renaissance culture. While the same ideas as those already mentioned continue to be discussed, the writers of the late eighteenth century contributed the idea of the rise of commerce as a cause of the Renaissance and also initiated the tendency to push the beginnings of the Renaissance farther back into the Middle Ages. Finally, the work devoted to the idea of the Renaissance in the first part of the nineteenth century laid the groundwork for later philosophical interpretations of the Renaissance.

Thus the thesis establishes a continuous interest in the idea of the Renaissance which starts in the Renaissance itself and brings the history of this idea in England to 1837. Subsequent study will show an increase in the volume and complexity of the discussion of the idea of the Renaissance to the present day.

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## MANUFACTURES

### THE MEXICAN WOOL INDUSTRY IN THE SIXTEENTH CENTURY

William H. Dusenberry, Thesis (Ph.D.)

University of Michigan, 1941

Julius Klein, in his well-known study, The Mesta, claims that all attempts to legislate the Castilian Mesta into existence in the New World were ludicrous failures. He goes on to say: "In Mexico, as in Santo Domingo, all efforts to introduce sheep migrations were frustrated by the absence of favorable geographic conditions and by the greater attention to other industries, notably mining. The only part of the Mesta code which survived was the ancient arrangement for the semiannual meeting to dispose of stray animals."<sup>1</sup>

Contrary to Klein's opinion that the influence of the Mesta was negligible in New Spain, the documentary sources clearly indicate that the pastoral industry, due to the protection of the Mesta, gradually outdistanced mining and all other industries in importance. The cabildo records of Mexico City are replete with regulations pertaining to the pastoral industry, while little attention is paid to mining. Many and minutely detailed were the cédulas of Charles V and Philip II which were intended to regulate the grazing industry in the new colony. Due to the liberal policy of the Spanish monarchs toward stock-raisers and farmers, almost every settler in New Spain kept at least a few sheep or cattle. The innumerable law-suits between the cattlemen and the sheep-owners became too great a burden on the audiencia, and it became necessary to transfer the Mesta, or sheep-owners' fraternity, to the colony to settle these petty disputes. This interesting institution was introduced largely because of the wisdom and foresight of Antonio de Mendoza, the first viceroy.

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1. Julius Klein, The Mesta, A Study in Spanish Economic History, Cambridge, 1920, p. 9.

The duties of the alcaldes de mesta were many and varied. They were ex-officio members of the cabildos, or town councils. They assisted the cabildo members in the following functions: the expedition of all matters pertaining to the ejidos, or common pastures; the slaughter, inspection, and sale of meat; the regulation of weights, and weight inspection; the assessment and collection of taxes. They assigned stray animals to their rightful owners. They regulated brands in minute detail. They tried cases arising among the herdsmen and flock-masters. They assessed and collected fines and penalties, and regulated damages. In brief, they performed all duties necessary for the protection and promotion of the pastoral industry.

Although mining was a leading pursuit in New Spain from the first, historians have greatly exaggerated its importance, and the pastoral industry has been almost totally neglected. The romance of the Conquest and of the silver fleets did much to give disproportionate prominence to the production of gold and silver in popular accounts of Spanish colonization. The Spaniards, because of their greed and in order to add to the depleted royal coffers, soon exploited the richest mineral deposits; but the farmers and herdsmen were engaged in more secure occupations; the hold they gained was maintained long after the mines had been abandoned. It was livestock-raising and agriculture that turned out to be the enduring fruits of the Spanish Conquest, and not gold and silver.

This study of the Mexican pastoral industry adds a forgotten chapter to one of the greatest American industries; the grazing industry of our whole trans-Mississippi west is based on Mexican antecedents. The Mesta of New Spain was the forerunner of several institutions of its kind which still exist for the benefit of the herdsmen and flock-masters.

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## MATHEMATICS

### THE SUM OF THE VALUES OF A RATIONAL FUNCTION OF $s$ VARIABLES OVER THE SET OF ALL THE $n$ -PARTITE PERMUTATIONAL PARTITIONS OF A GIVEN POSITIVE INTEGER

Leopoldo V. Toralballa, Thesis (Ph.D.)  
University of Michigan, 1941

By the set of all the  $n$ -partite permutational partitions of a given positive integer  $A$ , is meant the set of all ordered sets

$$(x_1, x_2, \dots, x_n)$$

where  $x_i \geq 1$  and  $x_1 + x_2 + \dots + x_n = A$ .

The symbol  $\sum_{A,n} f(x_1, x_2, \dots, x_s)$  is used to denote the sum of the values of  $f(x_1, x_2, \dots, x_s)$  as the arguments range over the set of all the  $n$ -partite permutational partitions of  $A$ . For instance,

$$\sum_{A,n} (x_1^2 + x_2) = 30.$$

The general problem is to obtain a convenient expression for  $\sum_{A,n} f(x_1, x_2, \dots, x_s)$ ,  $s \leq n$ , in terms of  $A$ ,  $n$ , and the characteristics of  $f$ .

Since  $\sum_{A,2} f(x_1) = \left[ \Delta^{-1} f(x_1) \right]_1^A$ , it is clear that  $\sum_{A,n} f(x_1, x_2, \dots, x_s)$  is a generalization to several variables of the notion of finite integral.

$\sum_{A,n} f(x_1, x_2, \dots, x_s)$  may be looked upon as an integral over a certain discrete  $n$ -dimensional set. When this set is two-dimensional and  $f$ , a function of one variable, we have the ordinary finite integral.

The dissertation considers principally the case where  $f$  is a rational integral function. Regarding the case where  $f$  is a rational fractional function all that is presented is a general method by which a particular problem might be solved.

A consideration of the results in the particular cases where  $f$  is a homogeneous function of the first, second, third, and fourth degrees suggest a relation of the form.

$$\sum_{A,n} x_1^{m_1} x_2^{m_2} \dots x_s^{m_s} = \frac{1}{n!} A^{(n)} + \frac{f_1(m_1, \dots, m_s)}{(m+1)!} A^{(n+1)} \\ + \frac{f_2(m_1, \dots, m_s)}{(n+2)!} A^{(n+2)} + \dots + \frac{f_{m-1}(m_1, \dots, m_s)}{(n+m-1)!} A^{(n+m-1)}$$

where  $m = \sum_{i=1}^s m_i$ , and  $f_i$  is a function only of  $m_1, m_2, \dots, m_s$ .

By successively letting  $A$  take the values  $n+1, n+2, n+3$ , and  $n+4$  in the above equation, one obtains the expressions for  $f_1, f_2, f_3$  and  $f_4$ . An examination of these expressions suggest the general formula

$$f_1 = (P-1)^{s \oplus 1} ]_{m_1, m_2, \dots, m_s}, \text{ where}$$

$$P^{s \oplus 1} ]_{m_1, m_2, \dots, m_s} \equiv \sum_{s+1, s} x_1^{m_1} x_2^{m_2} \dots x_s^{m_s} \text{ and}$$

$$(P-1)^{s \oplus 1} ]_{m_1, m_2, \dots, m_s} \equiv P^{s \oplus 1} - (s+1)P^{s \oplus 1-1} +$$

$$\frac{(s+1)^{(2)}}{2!} P^{s \oplus 1-2} - \frac{(s+1)^{(3)}}{3!} P^{s \oplus 1-3} + \dots + (-1)^1 \frac{(s+1)^{(1)}}{1!} P^s.$$

All these lead to the following theorem:

$$\sum_{A,n} x_1^{m_1} x_2^{m_2} \dots x_s^{m_s} = \sum_{r=0}^{m-1} (P-1)^{s \oplus r} ]_{m_1, \dots, m_s} \frac{A^{(n+r)}}{(n+r)!}$$

This theorem is proved by induction.

Thus the original summation problem is reduced to the evaluation of the set of functions,



$$\sum_{s+t,s} x_1^{m_1} x_2^{m_2} \dots x_s^{m_s}, \quad t = 0, 1, \dots, m-1.$$

While this latter problem is essentially of the same nature as the original one, the use of this result does permit great savings in the labor of actual calculation. In Chapter IV the author gives an expression for  $(P-1)^{s \oplus r}$  in terms of differences of zero in several variables.

In Chapter III the writer considers the factorial function  $x_1^{(m_1)} x_2^{(m_2)} \dots x_s^{(m_s)}$ . By methods similar to the preceding he arrives at and proves the following theorem:

$$\sum_{A,n} x_1^{(m_1)} x_2^{(m_2)} \dots x_s^{(m_s)} = m_1! m_2! \dots m_s! \sum_{p=0}^{s-1} \frac{(s-1)^{(p)}}{p!} \frac{A^{(n-s+p+\sum_1^s m_1)}}{(n-s+p+\sum_1^s m_1)!}$$

Chapter IV gives an expression for  $\sum_{A,n} x_1^{m_1} x_2^{m_2} \dots x_s^{m_s}$  in terms of differences of zero in several variables.

The well-known relation

$$x_1^{m_1} x_2^{m_2} \dots x_s^{m_s} = \sum_{v_1=1}^{m_1} \sum_{v_2=1}^{m_2} \dots \sum_{v_s=1}^{m_s} \left[ \frac{x_1^{(v_1)}}{v_1!} \frac{x_2^{(v_2)}}{v_2!} \dots \frac{x_s^{(v_s)}}{v_s!} \Delta_{x_1}^{v_1} \Delta_{x_2}^{v_2} \dots \Delta_{x_s}^{v_s} 0^{m_1} 0^{m_2} \dots 0^{m_s} \right]$$

leads to the theorem

$$\sum_{A,n} x_1^{m_1} x_2^{m_2} \dots x_s^{m_s} = \sum_{v_1=1}^{m_1} \sum_{v_2=1}^{m_2} \dots \sum_{v_s=1}^{m_s}$$

$$\left[ \begin{array}{ccccccc} v_1 & v_2 & & v_s & m_1 & m_2 & m_s \\ \Delta_{x_1} & \Delta_{x_2} & \dots & \Delta_s & 0 & 0 & \dots 0 \\ \sum_{p=0}^{s-1} \frac{(s-1)(p)}{p!} \frac{A^{(n-s+p+\sum_1^s m_i)}}{(n-s+p+\sum_1^s m_i)!} \end{array} \right]$$

In Chapter V the author considers the evaluation of  $\sum_{A,n} \frac{P(x_1, x_2, \dots x_n)}{Q(x_1, x_2, \dots x_n)}$ , where P and Q are polynomials. No important induction result is given but a method is presented by which a particular summation problem may be solved.

By means of Abel's expressions for

$\sum_{x=1}^n \frac{1}{m+x}$  and  $\sum_{x=1}^n \frac{1}{(m+x)^t}$  in terms of definite integrals, he arrives at such formulas as

$$\sum_{A,2} \frac{a_1 x_1 + a_2 x_2 + a_3}{b_1 x_1 + b_2 x_2 + b_3} = \frac{a_1 - a_2}{b_1 - b_2} (A-1) - \left\{ \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix} A + \begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix} - \begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix} \right\} \int_0^1 \frac{\frac{b_2 A + b_3}{b_1 - b_2} - x \frac{(A-1)b_1 + b_2 + b_3}{b_1 - b_2}}{1 - x} dx$$

In the Appendix the author gives a few applications in statistics and probability.

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## PHILOSOPHY

### AN INTERPRETATION OF THE NATURE OF PRESENCE AND SOME IMPLICATIONS OF THE INTERPRETATION

Archie J. Bahm, Thesis (Ph. D.)  
University of Michigan, 1933

This dissertation summarizes an investigation into the nature of what is commonly called "consciousness" or "experience" or "awareness" or "the specious present," but which here is called "presence" for technical reasons. The investigation attempted to determine two things: (1) whether presence could be defined, could be discovered to have certain essential characteristics, from "purely" empirical observation, and (2) whether such definition, or such essential characteristics as might have been found, implied anything concerning the existence or nature of what is not in presence.

Conclusions reached were: (1) that, from "purely" empirical observation, it cannot be concluded validly that presence does have any essential characteristics, and thus that any essential conditions, which presence may be claimed to have, are posited on some basis other than "purely" empirical observation, and (2) that this conclusion implies that all judgments intended to be about anything not in presence are uncertain, and (3) that the doctrines of those who contend either that presence has constant characteristics (e.g., Kant) or that something not in presence is implied by something in presence (e.g., realists) are unwarranted.

The procedure involved: (1) critical examination of question-begging terminology; (2) critical consideration of assumptions involved in attempting to make such a "purely" empirical interpretation of presence; (3) an examination of the following ten characteristics, sometimes considered essential to presence, in order to demonstrate that they are not essential: implicitness, boundaries of presence,

margin of presence, unity, duration, change, the self, purpose, knowledge, truth; (4) a reconsideration of the just-mentioned characteristics in order to point out significant implications of the foregoing conclusions for related philosophical problems.

Since the conclusions give no grounds for certainty concerning the existence or nature of what is not given, and since such lack of certainty is undesirable practically, some statement about the possibility of knowledge and truth and "practical certainty" seemed desirable. An appendix was added sketching an outline of a system of philosophy consistent with the conclusions concerning lack of certainty. A "principle of tentativity" was presented as basic to a system of "Tentative Realism."

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## EPISTEMOLOGICAL FOUNDATIONS OF FORMAL LOGIC

John James Wellmuth, Thesis (Ph. D.)

University of Michigan, 1940<sup>1</sup>

The thesis represents an attempt to inquire into the nature of abstract symbol systems, by means of reflective analysis, and to evaluate their significance for logic and for philosophy in general in the light of commonsense principles of thought, apart from purely technical and systematic considerations. The first of the four lengthy chapters whereof the thesis is composed contains an analysis of the notion of "abstract symbol system," and a discussion of the conditions which must be fulfilled if such a system is to represent directly and pictorially the structure of other systems. This chapter ends with some preliminary conclusions about the status of formal logic as the science of system-structure. The second chapter is concerned with the question whether an abstract symbol system may be regarded as meaningless, and if so, in what sense. After some general reflections on the notion of meaning, and an analysis of the meaning of abstract symbols in terms of connotation and denotation, it is suggested by way of conclusion that the formation rules and transformation rules of such systems actually give meaning to the symbols of the system, independently of any specific interpretation of the system. In the third chapter a detailed analysis and interpretation is made of a set of postulates for Boolean algebra (a variant of one of Huntington's sets); and on the basis of this analysis, it is maintained that such postulates are not only readable as general propositions, apart from any specific interpretation, but that their consistency and truth are testable by an understanding of their meaning, and that they convey quite definite

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<sup>1</sup> Degree conferred February, 1941.

though general information about the possible interpretations of the system, thus imposing limits upon the interpretability of the system irrespective of formal considerations. The fourth and final chapter is mainly concerned with Jorgensen's attempt to employ truth-functions as a guarantee of the validity of formal logic, and emphasis is placed on the danger of accepting a logistic analysis of concepts as adequate for philosophy or even for ordinary discourse.

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## PHYSICS

### ELECTRODEPOSITION OF COPPER IN THE PRESENCE OF ADDITION AGENTS

Guita Marble, Thesis (Ph. D.)  
University of Kansas, 1935

The effect of seventy-six addition agents, of a varied chemical nature, upon the appearance, mass, and microstructure of electrodeposited copper was determined.

An acidified copper sulphate solution was used as the standard plating bath. All electrolytic cells were run in duplicate and consisted of the standard plating bath plus an addition agent. A pair of control cells containing the standard plating bath alone was run in series with the experimental cells to serve as a basis of comparison.

The electrodes consisted of heavy sheet copper anodes and platinum foil cathodes each welded to a handle of the same metal. Electrolysis was carried out at a constant temperature of 30°C. Approximately 0.25 gram deposits were secured using a direct current of one ampere per square decimeter supplied by Edison storage batteries.

After removal from the plating baths, the cathodes were rinsed, dried and weighed. Macroscopic and microscopic examinations of the deposits were made to determine the character of the deposit and the type and size of the crystalline structure. Photographs and photomicrographs were taken to serve as a permanent record of the results obtained.

The deposits obtained from the standard plating bath alone with no addition agent were bright, adherent, slightly rough and fairly uniform in appearance. Microscopic examination showed the deposits consisted of very irregularly-shaped, plate-like crystals with no well-defined crystalline faces.

On the basis of the size and structure of the crystals, the electrolytic copper deposits

obtained were classified approximately into four large groups, namely: (1) those similar to the standard; (2) finely crystalline; (3) coarsely crystalline; and (4) unusually large, individual crystals. Within each group numerous variations occurred. Striated deposits were frequently obtained and less often, treed deposits.

No simple relationship was found between the type of the deposit and the chemical character of the addition agent. The substances used as addition agents included inorganic salts, aldehydes, ketones, acid and basic dyes, dyes of the triphenylmethane, thiazine, and xanthone groups, nitro dyes, colloidal proteins, complex ring compounds containing reducible groups, substitution products of methane, carbohydrates, amines, esters, alcohols, fatty acids and their substitution products, quinones, and soaps.

It was found that an addition agent which produced a marked difference in the crystal size of the deposit also produced an appreciable difference in the mass of the deposit as compared with the control. However, there was no relationship between the sign of the difference and the effect produced. That is, an addition agent in which the mass of the deposit was greater than that of the control did not always produce a deposit of smaller crystal size, or vice versa.

The dyes, of various kinds, used as addition agents produced a variety of deposits, with no constant agreement between dyes of closely related chemical structure and the type of deposit produced.

The results of the study indicated that it is not possible as yet to predict the nature of a specific substance which will prove effective as a desirable addition agent but that such substances must still be sought by the trial and error method.

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## EVALUATION OF SOME FACTORS AFFECTING MATERIAL TRANSFER COEFFICIENTS IN ANNULI

James H. Wiegand, Thesis (Ph.D.)  
University of Michigan, 1941

A basic method of correlation of transfer data exists in the Reynold's analogy. This may be interpreted as: "the ratio of the energy transferred by friction in an apparatus to the energy available for transfer is equal to the ratio of the material transferred in the apparatus to the material available for transfer." This analogy is valid only for the turbulent zone. Application to transfer in closed channels requires the introduction of factors to account for the influence of the non-turbulent zones at the walls. This results in a general expression for material transfer in terms of the friction factor,

$$f = N_G \frac{S}{A} \phi_D$$

where  $N_G$  is the number of transfer units as defined by A. P. Colburn,  $S$  is the cross-sectional area of flow,  $A$  is the area of transfer, and  $\phi_D$  is a function of the diffusional properties of the fluid. The simplest type of expression for  $\phi_D$  is  $2(\mu/\rho D)^m$  where  $m$  equals 0.6 for vaporization and 0.7 for absorption.

The general relation for  $f$  applies to friction, for which  $\phi_D$  equals  $2(C_p \mu/k)^m$ , with  $m$  equal to 0.6 for heating and 0.7 for cooling of the fluid.

Values of  $f$  for material transfer, heat transfer, and friction give good correlations of the type  $f = K/Re^n$ . For values of  $Re$ , the Reynold's number, from 5,000 to 100,000 for commercially used pipe surfaces.

Data are obtained on the vaporization of water into air in a wetted-wall column with one inch standard brass pipe calming section giving  $K = 0.016$  and  $n = 0.17$  for  $Re$  from 2,000 to 20,000. A value of

$m$  of 0.56 is used to agree with the previous data of Gilliland and Sherwood, who obtained  $K = 0.023$ ,  $n = 0.17$ , and  $m = 0.56$  for a wetted-wall column with standard iron pipe calming section.

The author's apparatus was built so that wetted-wall coefficients could be obtained with an annular rod present operated with the walls wet separately or together, and values obtained by the two methods agree well. Three annular rod diameters were used, and the values of  $n$  and  $K$  obtained are as follows:

$d_2/d_8$	overall value		outer wall value		inner wall value	
	$n$	$K$	$n$	$K$	$n$	$K$
0.39	0.06	0.007	0.03	0.004	0.12	0.013
0.52	0.06	0.007	0.03	0.004	0.20	0.025
0.80	0.05	0.005	0.05	0.005	0.05	0.005

where  $m = 0.56$ . The values were obtained for a range of  $Re$  from 2,000 to 10,000, where the diameter was calculated as  $(d_2 - d_1)$ . The results agree well with previous works on friction and heat transfer in annuli, although much lower values of  $n$  are obtained in the present case.

No simple expression for the equivalent diameter of an annulus will bring annular data into agreement with round pipe experimental data. It is concluded that complete understanding of transfer processes in annuli cannot be achieved by measurement of overall coefficients alone, but requires a more basic method of study such as the examination of velocity component variations within the fluid stream.

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## PSYCHOLOGY

### THOUGHT AND LANGUAGE IN WHITEHEAD'S CATEGORIAL SCHEME

Cornelius Laçy Golightly, Thesis (Ph. D.)  
University of Michigan, 1941

This thesis is a critical study of thought and language as their natures are implied in Whitehead's categorial scheme. Whitehead has two distinct philosophies of thought and language. One is developed within his framework of categorial notions; the other is found in the many "extra-categorial" assertions which Whitehead has often enunciated. By "extra-categorial" we mean assertions made by Whitehead when he was not thinking implicitly in terms of the categorial notions. Thus the extra-categorial philosophy of thought and language consists mainly of statements made prior to the construction of the scheme and subsequent assertions which apparently are not interpretable in terms of the categorial ideas. In the extra-categorial beliefs about thought Whitehead places great faith in the power of speculative reason to grasp the innermost nature of things through flashes of insight. But in the extra-categorial beliefs about language he deplores the inability of language to express adequately the metaphysical first principles. Language is set apart from thought and is described as its tool which may be redesigned in the same way that, in a physical science, preexisting appliances are redesigned.

We set up the hypothesis that there is lack of consistency between these extra-categorial assumptions and the implications of the categorial scheme for a philosophy of thought and language. Within the framework of categorial notions the "tool-making" theory of language is repudiated. Thought and language are shown to be closely interrelated and language is now described as one of the storehouses of the crude evidence from which speculation derives its categories. Philosophy thus is linked with mystic poetry.

Furthermore, our point of view is that the categorial notions cannot give an adequate account of the phenomena of thought and language. The method of proving this thesis consists in analyzing the fundamental concepts of the scheme and noting their relevant implications. Especial attention is paid to the actual entity and the doctrine of prehension. The dissertation contains a critique of the schematic method; a critical analysis of the categorial scheme with an investigation of Whitehead's reasons for abandoning subject-predicate categories; an examination of the concepts "subject-superject," self, and mind in which we prove that Whitehead's theory of "eternal objects" prevents a satisfactory explanation of the uniqueness and individuality of actual occasions and enduring objects; and discussion in categorial terms of judgment, symbolism and communication.

Our final conclusion is that the theory of feelings and the subject-superject cannot give an adequate explanation of the higher phases of human experience. Since the subject emerges from its prehensions there is the universal identification of feeling with causation. This is a negation of the sense of transcendent activity we experience in the acts of thinking and of communicating with others. Speculative philosophy of the kind that constructs a categorial scheme apparently involves overt creative acts not interpretable solely in terms of receptive feelings. Whitehead needs an adequate theory of the self which we believe necessitates a return to subject-predicate categories.

The value of Whitehead's philosophy is evidenced by the persuasiveness and ultimate good sense of his accounts of perception, causation, judgment, symbolism, communication and speculation. What we have endeavored to point out in our essay is the lack of adequate categorial foundations for some of these valuable notions.

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## A STUDY OF PUBESCENCE IN JUNIOR HIGH SCHOOL BOYS

Warren K. Layton, Thesis (Ph.D.)

University of Michigan, 1931

A dissertation completed at the University of Michigan reports a study of the types of behavior generally associated with early adolescence. During the second semester of the school year 1929-30 the investigator received detailed reports from 20 teachers concerning 547 boys in the Foch Intermediate School, Detroit. The teachers reported (1) general school conduct--good, fair, poor; (2) special types of behavior frequently associated with the adolescent years--marked awkwardness of movement, facial or other automatisms, daydreams, and alternations of mood; (3) tendencies to adolescent diseases--anemia, headache, nervousness, nosebleed, palpitation of the heart; and (4) attitude toward girls--attentiveness, infatuations, flirtatious attitude, writing and receiving love letters, shyness, indifference, and antagonism.

Other items studied for the purpose of comparison with pubescence were scholarship, school citizenship, regularity of attendance, and punctuality. Separate analyses were made to discover the extent to which the teachers agreed on what they reported as having observed, and separate tabulations were made for men and women teachers. The results indicated that the observations of boys by several teachers were quite similar to those of the group as a whole. Men and women teachers gave comparable and similar reports in most cases.

In the matter of consistency of the observations of the teachers from the standpoint of variations from month to month, no striking increase or decrease was found in the number of individual items reported in separate months.

It was found that attendance and punctuality records and marks in school citizenship were poorer in

the case of pubescent boys. The teachers' ratings of conduct indicated poorer adjustment in this regard on the part of pubescent boys than on the part of either pre-pubescent or partially pubescent boys. From the reports of the teachers' observations of specific conduct reactions it was found that disobedience, defiance, inattention, lack of application, cheating, talking without permission, and display of temper were observed more often in pubescent boys than in pre-pubescent ones.

Special behavior frequently associated with the period of early adolescence, including marked awkwardness of movement, automatisms, daydreaming, emotional instability, infantile behavior, inhibitions, and alternations of mood were observed more frequently in pubescent boys. In the number of observations of attentiveness to girls, including infatuation, flirting, and writing and receiving love letters, the pubescent group exceeded the other groups, while in the case of indifference to girls the pre-pubescent group was found to excel.

From separate tabulations of various observation reports for a special group of 75 thirteen-year-old boys distributed evenly among the three pubescence groups, it appeared that the elimination of the chronological age factor made little difference in the nature of the reports.

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## THE RELATIONSHIP OF AFFECTIVITY TO VARIOUS MEASURES OF GROWTH IN CHILDREN

Mary Elizabeth Mechem, Thesis (Ph.D.)  
University of Michigan, 1941

### Definition of the Problem

The writer has attempted to adapt the role played by affectivity (general feeling state) to the concept of the child as a whole. The study of the affective area of personality adds another approach to the problem undertaken in the University of Michigan Child Growth Studies, that of describing the "whole" child through time.

It was necessary to construct an instrument for measuring affectivity in order to relate results to various other measures of growth in children.

### Description of the Method and the Subjects

Since the population studied included very young children it was decided that the instrument of measurement should utilize oral rather than written reports. Hence the individual personal interview was selected as the medium through which the personality area in children would be sampled. Interview questions were collected from published personality tests, clinical findings, and textbooks. Scoring procedures were based upon the collective judgments of 150 adults with advanced training in psychology and education of children. The judges determined which responses to the interview questions were indicative of a high degree of affectivity. One score point was allotted to each favorable response so that high scores designate desirable affectivity levels.

Scores obtained from interviews were correlated with other available measures of the same children. These measures included organismic age, organismic status, mental age, educational age, problem tendencies, extroversion-introversion, average

deviation of all measures, and developmental age. After group trends were summarized four case studies were presented to illustrate the relation of contrasting affectivity scores to growth patterns in individual children.

Sixty-five University Elementary School children ranging in age from seven to twelve-and-a-half years served as subjects for the study. Of this number, forty-four remained to be interviewed a second time during the following year. Affectivity scores derived from the interviews administered during each year of the study were correlated with various other measures of growth in the children studied. In addition, for the children who had two consecutive interviews, analysis was made of the change in affectivity scores which took place in the interval.

#### Summary of Findings

For the population studied there was stability of central tendency and of the amount of variation in affectivity scores for the two series of interviews. Changes which occurred in affectivity scores for individual children or for grade groups on the second interview as compared with the first thus operated within a stable central tendency for the total group. A reliability coefficient of .82 was obtained for the instrument by relating scores for all children on even-numbered interview questions with scores on odd-numbered questions. In general, the findings suggest that for the population studied, overt behavior and verbalization of covert feeling bear demonstrated relationships to each other. These relationships are multiple in that many factors (such as mental age, achievement, maturity of interest, and growth rate) seem to limit and modify each measure of relationship.

Changes within the growth picture seem to play a more important role in the analysis of affectivity data than does the study of status alone. It is extremely difficult to describe what a child's



affectivity level will be at a given time by examining his status in other measured factors. However, by determining the general direction which his composite growth pattern is taking during a specified interval, it is possible to describe fairly accurately the direction which his affectivity is taking during the same interval.

Affectivity seems to be a problem of group relativity as well as of status and change within the growth patterns of individual children. Absolute measures, such as mental age, which seem to bear very little relationship to affectivity in a group of children of varying ages, will relate more closely to affectivity within a school grade.

Within the limits of the experimental conditions the present study of the affective side of the child's development has tended to suggest further the importance of viewing the "whole" child in his field of operation and of recognizing the reciprocal effect of child and environment.

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## MEASUREMENT OF EMOTIONAL REACTIONS

T. Xoomsai, Thesis (Ph.D.)  
University of Michigan, 1941

The purpose of the investigation is to test a statistical method for measuring the relative intensity of emotional reactions which may be evoked by different categories of experience. The thesis thus concerns itself with a problem of methodology in the main, though any conclusions derived from the content are of value in both the general and the applied field of psychology.

The first part of the investigation is to determine whether certain kinds of systematic errors, presumably cognitive and affective errors, involved in the rating of preference of emotional stimuli of different kinds may be used as an index of the intensity of the preference. Such systematic errors are ascertained and discovered through the relationships between the three measures called the accuracy correlation, the self-consistency correlation, and the group-consistency correlation.

Ten tests of different emotional stimuli in pictures and in verbal forms, each having two or three sub-tests, are designed to measure preferences of a group of college students who serve as subjects. Each test consists of ten items which are to be arranged in order of the intensity of the subjects' preferences. The consensus of opinions for each test is computed and then used subsequently as a criterion to determine how individual ratings deviate from the group trend. The degree of deviation is measured in terms of the size of a coefficient of correlation between an individual rating and the criterion. The average of such coefficients is called the accuracy correlation of the test. Since each subject repeats each test after a certain interval of time, it is possible to compute a coefficient of correlation between the



first and the second rating. The average of such coefficients is called the self-consistency correlation. An adequate sampling of different subjects' ratings in each test also are intercorrelated, and the average of the coefficients obtained is called the group-consistency correlation of the test.

It has been found that the square of the accuracy correlation and the group-consistency correlation of the same test are practically the same, while the self-consistency correlation is very significantly larger than the other two measures. Analogous to experiments of exactly the same nature in which objective material such as weights, lines, areas, etc., are used and in which the ratio between the group-consistency correlation and the self-consistency correlation is found to be in the neighborhood of one, it is assumed that the inflation of the self-consistency correlation over the group-consistency correlation is due to cognitive and affective systematic errors.

The effect of the affective systematic error or errors in each test is assumed to be a measure of the intensity of preference for or the sheer emotional power of the stimulus in that test.

It is unfortunate, however, since each test is repeated, that the cognitive systematic errors due to the memory factor, come in to affect the second rating, thus inflating the self-consistency correlation to a greater extent than would be the case through the influence of affective systematic errors alone. Various methods, including the factor analysis technique, are used to separate the cognitive systematic errors from the affective systematic errors. Assuming that the scores used are of such a sort that factor analysis may properly be used, the second aspect of the thesis presents two sets of factorizations of the abilities used in the tests. The results are positive and suggestive. In one factorization, the accuracy coefficients being used as scores, four factors are obtained which are assumed to be qualities

of emotional reactions involved in preferences. In the other factorization, the self-consistency coefficients being used as scores, five factors are obtained. The extra factor obtained in the latter factorization, on the basis of the experimental control, is tentatively identified as the memory factor.

The memory factor presumably being ruled out through the use of the communalities from both factorizations, the remainder of the self-consistency correlation divided by its corresponding group-consistency correlation gives a subjectivity-objectivity ratio of each test. On the basis of these ratios, the investigation discloses a dividing line between emotions of violent excitement on one hand and emotions of deep depression on the other. An attempt is therefore made to rank different emotional reactions in the order of their intensities, thus: anger, excitement from sports and games, hunger (appetite), fear, sex, sympathy, tender emotion, or social emotion, and sadness.

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## SOCIOLOGY

### SELECTIVE PROCESSES IN A BLIGHTED AREA

Thomas M. Pryor, Thesis (Ph.D.)

University of Michigan, 1934

Investigators have pointed out that most American and European cities develop a deteriorated zone around the central business district. This study is an attempt to determine the causes of this deteriorated or blighted area in the city of Detroit, Michigan, and to suggest remedial methods for dealing with the problem of blight.

In the early days the area under consideration was the home of the wealthy and substantial families of Detroit who moved out of this area in response to both the attraction of outlying districts and the pressures of the area and areas immediately adjacent to it. This outward movement of population together with incoming residents who took the places vacated at the center showed the centrifugal drift of population by which the city grew.

Improved methods of transportation, rising standards of living, conformity to fashion, and the influence of advertising and propaganda attracted residents out of the area. The expansion of commerce and industry, the invasion of the automobile, with the noise and confusion of increased traffic, the invasion of ethnic groups of a different cultural level, and the invasion of vice, created pressures which tended to drive residents out of this area and tended to blight it for ordinary residential purposes.

Attention was given to land utilization in the area, from the earliest records to the present time. An attempt was made to correlate blight with structural types and life expectancy of buildings. All structural changes in the area were recorded and their influence on blight was noticed.

The transitional character of the area was examined and forces such as commercialization and industrialization were noted with their resultant effects.

With a knowledge and a proper control of these processes, it would be possible to (1) rebuild this area so as to remove the blighted condition, and (2) prevent the further blighting of this and other areas.

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### AGRICULTURAL AND BIOLOGICAL CHEMISTRY

A study of certain factors influencing the chemical composition of flue-cured cigarette leaf tobacco. William L. Porter, Ph.D. Thesis; Pa. State College, 1940. pp. 58, Pub. No. 242, (P.S. 1940, Vol. III).

Enzyme studies of leaf tobacco. Bo Prytz, Ph.D. Thesis; Pa. State College, 1940. pp. 116, Pub. No. 278, (P.S. 1940, Vol. III).

Factors affecting fat oxidation and the change in fat constants with volume of oxygen absorbed. Mary Louise Shaner, Ph.D. Thesis; Pa. State College, 1940. pp. 139, Pub. No. 279, (P.S. 1940, Vol. III).



AGRICULTURAL AND BIOLOGICAL CHEMISTRY

Limitations of Certain Methods used in the estimation of Vitamin A and its precursors. Francis William Chornock, Ph.D. Thesis; Pa. State College, 1940. pp. 79, Pub. No. 238, (P.S. 1940, Vol. III).

Potassium availability in Puerto Rican soils. Rafael Burgos-Macias, Ph.D. Thesis; Pa. State College, 1940. pp. 70, Pub. No. 266, (P.S. 1940, Vol. III).

Riboflavin and its quantitative estimation by physical-chemical methods. Robert A. Stewart, Ph.D. Thesis; Pa. State College, 1940. pp. 92, Pub. No. 244, (P.S. 1940, Vol. III).

The effect of green manure and nitrogen on soil organic matter and other soil constituents Anthony Chester Richer, Ph.D. Thesis; Pa. State College, 1940. pp. 115, Publ. No. 274, (P.S. 1940, Vol. III).

The effect of manganese on calcification in the growing rat in the presence and absence of Vitamin D. Charlotte Stanton Schweitzer, Ph.D. Thesis; Pa. State College, 1940. pp. 84, Pub. No. 273, (P.S. 1940, Vol. III).

The effects of Vitamin B<sub>1</sub> and of manganese on the carbohydrate metabolism of fusarium lini bolley. Bernard Trabin, Ph.D. Thesis; Pa. State College, 1940. pp. 93, Pub. No. 245, (P.S. 1940, Vol. III).

The utilization and excretion of ascorbic acid by the dairy cow. Claude Arthur Knight. Ph.D. Thesis; Pa. State College, 1940. pp. 146, Pub. No. 254, (P.S. 1940, Vol. III).

AGRICULTURAL EDUCATION

Characteristics of teachers of vocational agriculture. A study to facilitate a more careful selection of candidates for teacher-training in agriculture. Fred Eugene Armstrong, Ph.D. Thesis; Pa. State College, 1940. pp. 175, Pub. No. 240, (P.S. 1940, Vol. III).

AGRONOMY

Chemical and vegetative studies of magnesium availability in certain Pennsylvania soils. Willard Hershel Garman, Ph.D. Thesis; Pa. State College, 1939. pp. 152, Pub. No. 115, (P.S. 1939).

Potash availability studies in Pennsylvania orchard soils II. A comparison of soil analyses and foliar diagnosis for determining the potassium status. Ellsworth Chisolm Dunkle., Ph.D. Thesis; Pa. State College, 1940. pp. 122, Pub. No. 257, (P.S. 1940, Vol. III).

BACTERIOLOGY

A serological study of monotrichic members of the genus Pseudomonas. Rhet Gibbes Harris, Ph. D. Thesis; Pa. State College, 1940. pp. 47, Pub. No. 246, (P.S. Vol. III).

The preparation and the chemical and bacteriological analysis of animal and vegetable peptones, Arnold Evans Hook, Ph.D. Thesis; Michigan State College, 1940, pp. 85, Pub. No. 213 (M.A. 1940, Vol. II, No.2).

The relation of bacterial activity to the disappearance of citric and malic acids in the bulk fermentation of tobacco. Donald Welcomer McKinstry, Ph.D. Thesis; Pa. State Col., 1939. pp. 42, Pub. No 124, (P.S. 1939).

A study of serum therapy in experimental pneumococcus pneumonia in rats. Alice Cornelia Hayes Kempf, Ph.D. Thesis; University of Michigan, 1940. pp. 114, Pub. No. 212 (M.A. 1940, Vol. II, No. 2).

BIOLOGICAL CHEMISTRY

Glycine Precursors: The availability of some N-alkyl glycine derivatives for the synthesis of hippuric acid by the rabbit. Lynn DeForrest Abbott, Jr., Ph.D. Thesis; University of Michigan, 1940. 75 pp. Pub. No. 165 (M.A. 1940, Vol. II, No. 2).



BIOLOGICAL CHEMISTRY

The intermediary metabolism of some sulfur-containing compounds related to cystine. Frank R. Blood, Ph.D. Thesis; University of Michigan, 1940. pp. 75, Pub. No. 164 (M.A. Vol. II, No. 2).

The lipotropic action of some sulfur-containing amino acids and related substances. Sam Allen Singal, Ph.D. Thesis; University of Michigan, 1940. pp. 82, Pub. No. 166 (M.A. 1940, Vol. II, No. 2).

Studies on the carotenoid pigments of egg yolks from hens on various diets. Fielden Emmitt Jacob, Jr., Ph.D. Thesis; University of Missouri, 1939. pp. 74, Pub. No. 225 (M.A. 1941, Vol. III, No. 1).

A study of the origin and significance of thiosulfate in the animal organism. Joseph H. Gast, Sc. D. Thesis; University of Michigan, 1940. pp. 114, Pub. No. 214 (M.A. 1940, Vol. II, No. 2).

The utilization of lactose by the white rat. Margaret Elizabeth Nalder, Ph.D. Thesis; University of Michigan, 1940. pp. 152, Pub. No. 224 (M.A. 1941, Vol. III, No. 1).

BIOLOGY

Gonadal reactivity to a sex hormone in fowl during embryological development. Elmer Joseph Trame, Ph.D. Thesis; St. Louis University, 1934. pp. 109, Pub. No. 187 (M.A. 1940, Vol. II, No. 2)..

BOTANY

Comparative physiology of actinomyces in relation to potato scab. Mitrofan M. Afanasiev, Ph.D. Thesis; University of Nebraska, 1938. pp. 116, Pub. No. 55, (M.A. 1938, No. 1).

Studies on the physiology and ecology of roots. Warren Wesley Nedrow, Ph.D. Thesis; University of Nebraska, 1938. pp. 58, Pub. No. 53, (M.A. 1938, No. 1).

BOTANY

Studies on X-ray treatment of phlox. John S. Bangson, Ph.D. Thesis; Pa. State College, 1940. pp. 69, Pub. No. 253, (P.S. 1940, Vol. III).

Radiation and plant growth substance. Harold Ralph Clair McIlvaine, Ph.D. Thesis; Pa. State College, 1939. pp. 55, Pub. No. 123, (P.S. 1939).

CERAMICS

Glass formation in the soda-silica-titania, and soda-silica-phosphorus pentoxide fields. Alexis George Pincus, Ph.D. Thesis; Pa. State College, 1940. pp. 73, Pub. No. 251, (P.S. 1940, Vol. III).

The effect of various catalysts on the conversion of quartz to cristobalite and tridymite at high temperatures. Cho-Yuan Lin, Ph.D. Thesis; Pa. State College, 1939. pp. 92, Pub. No. 122, (P.S. 1939).

CHEMISTRY

I. A helium liquefier-calorimeter for heat capacities from 1-60°K; II. The entropy of ethyl alcohol from molecular data and the equilibrium in the hydration of ethylene; III. The heat capacity and entropy, heats of fusion and vaporization, and the vapor pressure of isopentane. Seymour Cyrus Schuman, Ph.D. Thesis; Pa. State College, 1940. pp. 84, Pub. No. 241, (P.S. 1940, Vol. III).

A new chemical detector for molecular beams. Julian Glasser, Ph.D. Thesis; Pa. State College, 1939. pp. 79, Pub. No. 116, (P.S. 1939).

An X-ray study of the structure of benzene, cyclohexane and their mixtures. Paul H. Bell, Ph.D. Thesis; Pa. State College, 1940. pp. 153, Pub. No. 237, (P.S. 1940, Vol. III).



CHEMISTRY

The condensation of some of the diphenyl alkyl carbinols with phenol in the presence of anhydrous aluminum chloride. Richard Ives Jackson, Ph.D. Thesis; Michigan State College, 1940. pp. 45, Pub. No. 211 (M.A. 1940, Vol. II, No. 2).

The effect of the position of substitution on the ionization constants of some aromatic ammono-acids in liquid ammonia. Dr. Czu-Chih Liu, Ph.D. Thesis; University of Kansas, 1929. pp. 89, Pub. No. 223, (M.A. 1941, Vol. III, No. 1).

Electric conductivity and ion diffusion in glass. Harold Roth Vinyard, Ph.D. Thesis; Pa. State College, 1938. pp. 44, Pub. No. 94, (P.S. 1938).

The extraction and the chemical nature of lignin from prairie soil. Marcus D. Weldon, Ph.D. Thesis; University of Nebraska. 1938. pp. 47, Pub. No. 57, (M.A. 1938, No. 1).

Furan arsenicals. William Woolverton Beck, Ph.D. Thesis; University of Nebraska, 1938. pp. 56, Pub. No. 58, (M.A. 1938, No. 1).

Further studies on the use of hydrogen fluoride as a condensing agent<sup>I</sup>. Herbert J. Passino, Ph.D. Thesis; Pa. State College, 1940. pp. 58, Pub. No. 239, (P.S. 1940, Vol. III).

Glacial acetic acid as a colloidal dispersion medium. C. G. Harry Johnson, Ph.D. Thesis; University of Kansas, 1940. pp. 119, Pub. No. 161, (M.A. 1940, Vol. II, No. 2).

Hydrogen Fluoride as a condensing agent. Sydney Archer, Ph.D. Thesis; Pa. State College, 1940. pp. 86, Pub. No. 236, (P.S. 1940, Vol. III).

The influence of exercise on the growing rat in the absence and presence of vitamin D. Roland Anton Morck, Ph.D. Thesis; Pa. State College, 1939. pp. 55, Pub. No. 126, (P.S. 1939).

CHEMISTRY

Part 1, Inversion of configuration in semi-pinacolic deamination; Part 2, Electronegativities of highly branched aliphatic groups; Part 3, Miscellaneous. Herbert Irving Bernstein, Ph.D. Thesis; Pa. State College, 1940. pp. 85, Pub. No. 262, (P.S. 1940, Vol. III).

Investigations in the dioxan series: The bromine derivatives of dioxan. Alphonse Joseph Siefker, Ph.D. Thesis; St. Louis University, 1934. pp. 81, Pub. No. 181 (M.A. 1940, Vol. II, No. 2).

The isomers of triisobutylene. Cyril D. Wilson, Ph.D. Thesis; Pa. State College, 1939. pp. 84, Pub. No. 134, (P.S. 1939).

I. Metathetical reactions of some alpha bromo ketones; II. The synthesis of N-butane. Richard Bernard Greenburg, Ph.D. Thesis; Pa. State College, 1940. pp. 65, Pub. No. 263, (P.S. 1940, Vol. III).

A preliminary study of the anodic phenomena occurring in organic electrolysis. Leonard William Gaddum, Ph.D. Thesis; University of Missouri, 1924. pp. 89, Pub. No. 226, (M.A. 1941, Vol. III, No. 1).

2-azoxy-2, 5-dimethylhexane; the molecular refractions of aliphatic azoxy compounds. David Edgar Ailman, Ph.D. Thesis; Pa. State College, 1938. pp. 130, Pub. No. 84, (P.S. 1938).

I. Neopentane and the neopentyl halides. II. Dehydration studies of neopentyl carbinols. III. Condensation reactions of isobutyraldehyde. Ewald Rohrmann, Ph.D. Thesis; Pa. State College, 1939. pp. 103, Pub. No. 132, (P.S. 1939).

Phosphomolybdic acid as an analytical reagent for the determination of thallium. James Franklin Miller, Ph.D. Thesis; Pa. State College, 1939. pp. 37, Pub. No. 125, (P.S. 1939).



CHEMISTRY

A photoelectric colorimeter and its use in determining some elements of physiological importance found in deep well water. Charles Wesley Fleetwood, Ph.D. Thesis; St. Louis University, 1937. pp. 107, Pub. No. 196, (M.A. 1940, Vol. II, No. 2).

I. Polymerization of 5-butyl-4-nonene with boron trifluoride; II. Reaction of alkyl halides with hydrogen fluoride. William Ellis Bissinger, Ph.D. Thesis; Pa. State College, 1940. pp. 238, Pub. No. 235, (P.S. 1940, Vol. III).

Condensation of some dialkyl aryl carbinols with benzene and phenol in the presence of aluminum chloride. F. A. Hughes, Ph.D. Thesis; Michigan State College, 1940. pp. 47, Pub. No. 217, (M.A. 1941, Vol. III, No. 1).

A preliminary survey of coal tar acids above the cresol range. Albert Harrison Holtzinger, Ph.D. Thesis; Pa. State College, 1939. pp. 373, Pub. No. 118, (P.S. 1939).

Reaction of aromatic amines with benzoic anhydride. C. Truman Steele, Ph.D. Thesis; University of Missouri, 1938. pp. 66, Pub. No. 155, (M.A. 1940, Vol. II, No. 2).

I. Reactions of esters with Grignard reagents. II. Preparation of 2,2-dimethyl-3-ethyl-pentane; III. Miscellaneous studies. Warren Schumann Forster, Ph.D. Thesis; Pa. State College, 1940. pp. 171, Pub. No. 234, (P.S. 1940, Vol. III).

The reaction of free radicals with silver salts. Howard Paul Hetzner, Ph.D. Thesis; University of Michigan, 1939. pp. 74, Pub. No. 100, (M.A. 1939, Vol. II, No. 1).

I. Reactions of Grignard reagents with alpha-halo ketones: a literature review. II. The optical rotation of a Grignard reagent. III. The polychlorides of neopentane. IV. The chlorination of cyclopropane. Benjamin R. Harriman, Ph.D. Thesis; Pa. State College, 1939. pp. 175, Pub. No. 117, (P.S. 1939).

CHEMISTRY

I. Reactions of neopentyl iodide. II. Studies on sulphur compounds. III. Lanosterol and agnosterol. Eugene Leroy Wittle, Ph.D. Thesis; Pa. State College, 1938. pp. 182, Pub. No. 78, (P.S. 1938).

I. Reactions with trifluorochloromethane; II. Polymerization of diisobutene to tetraisobutene; III. Condensation of paraformaldehyde with diisobutene. Rolston L. Bond, Ph.D. Thesis; Pa. State College, 1940. pp. 167, Pub. No. 269, (P.S. 1940, Vol. III).

The rearrangement of the propyl group in the Freidelcrafts reaction. Elizabeth Adams, Ph.D. Thesis; Pa. State College, 1938. pp. 123, Pub. No. 71, (P.S. 1938).

Reducing action of primary Grignard compounds. Isomerization of the *n*-amyl group in the presence of zinc chloride and hydrochloric acid. The reaction of neopentyl chloride with sodium. The action of alcoholic potassium hydroxide with alkyl halides. Alexander H. Popkin, Ph.D. Thesis; Pa. State College, 1939. pp. 194, Pub. No. 131, (P.S. 1939).

I. The rotational entropy of non-rigid polyatomic molecules. II. A low temperature adiabatic calorimeter for condensed gases; thermal data on methyl and dimethyl amine. Maxwell Leigh Eidinoff, Ph.D. Thesis; Pa. State College, 1938. pp. 49, Pub. No. 74, (P.S. 1938).

Separation of binary hydrocarbon mixtures. Carl S. Carlson, Ph.D. Thesis; Pa. State College, 1939. pp. 400, Pub. No. 111, (P.S. 1939).

Solubility of water in benzene. Egbert Mason Kipp, Ph.D. Thesis; Pa. State College, 1939. pp. 48, Pub. No. 121, (P.S. 1939).

The comparative stability of arylchloromethanes. Eugene B. Reid, Ph.D. Thesis; University of Michigan, 1939. pp. 67, Pub. No. 103, (M.A. 1939, Vol. II, No. 1).



CHEMISTRY

I. Studies on cyclic alpha, beta-unsaturated ketones; II. Miscellaneous studies. George Wesley Pedlow, Jr., Ph.D. Thesis; Pa. State College, 1940. pp. 132, Pub. No. 250, (P.S. 1940, Vol. III).

Studies in Ozonolysis - The preparation and properties of Glyoxylic Acid. Russel Hyer Hendricks, Ph.D. Thesis; St. Louis University, 1935. pp. 121, Pub. No. 183 (M.A. 1940, Vol. II, No. 2).

A study of the analytical properties of cinchonine salts of the iodometallic acids. Lester Kieft, Ph.D. Thesis; Pa. State College, 1939. pp. 23, Pub. No. 120, (P.S. 1939).

Studies on compounds containing the neopentyl system. Clarence Irwin Noll, Ph.D. Thesis; Pa. State College, 1938. pp. 195, Pub. No. 76, (P.S. 1938).

A study of coördination compounds of chromium with pyridine and quinoline. Arthur R. Clark, Ph.D. Thesis; Pa. State College, 1938. pp. 29, Pub. No. 72, (P.S. 1938).

I. Studies on derivatives of neopentane. II. Alpha-gamma-dihydroxy-beta, beta-dimethyl-butyraldehyde and reduction of lactones. III. Synthesis of methyl pinacolyl ketone. IV. Synthesis of ethyl ethylneopentyl-carbonylmalonate. David M. Jones, Ph.D. Thesis; Pa. State College, 1939. pp. 242, Pub. No. 119, (P.S. 1939).

Studies on detergents in non-aqueous and aqueous solvents. Charles Rush Philips, Ph.D. Thesis; Pa. State College, 1938. pp. 172, Pub. No. 77, (P.S. 1938).

A study of the factors influencing the detoxication of selenium in the animal body. Julius Schultz, Ph.D. Thesis; University of Michigan, 1939. pp. 153, Pub. No. 102, (M.A. 1939, Vol. II, No. 1).

CHEMISTRY

Studies on hexamethylethane. Louis Palmbeck, Jr., Ph. D. Thesis; Pa. State College, 1939. pp. 78, Pub. No. 129, (P.S. 1939).

A study of the kinetics of the reaction between tri-chloroacetic acid and trimethylethylene in the liquid phase. Charles Richard Clark, Ph.D. Thesis; University of Missouri, 1937. pp. 78, Pub. No. 138, (M.A. 1939, Vol. II, No. 1).

A study of the vaporization of liquids into a gas stream. George Walter Eckert, Ph.D. Thesis; University of Missouri, 1936. pp. 128, Pub. No. 136, (M.A. 1939, Vol. II, No. 1).

A study of the various factors pertaining to the quantitative measurement of vitamin B. Raymond A. Brown, Ph.D. Thesis; Pa. State College, 1938, pp. 167, Pub. No. 68, (P.S. 1938).

Synthesis and optical constants of some acid amides. Charles Maresh, Ph.D. Thesis; Pa. State College, 1940. pp. 134, Pub. No. 267, (P.S. 1940, Vol. III).

I. Synthesis of aliphatic t-butyl ketones; II. Mechanism of the reaction of grignard reagents with trimethylacetamide; III. Pinacolyl halides; IV. Isophorones; V. Chemistry of t-butylethylene. Vincent Carr Meunier, Ph.D. Thesis; Pa. State College, 1940. pp. 190, Pub. No. 272, (P.S. 1940, Vol. III).

I. Synthesis of 2-methyl-3-ethylhexane; II. Attempted preparation of the grignard reagent of ethoxyethyl chloride; III. Active hydrogen determinations. LeRoy P. Block, Ph.D. Thesis; Pa. State College, 1940. pp. 100, Pub. No. 233, (P.S. 1940, Vol. III).

Synthetical experiments in the chelidone group of alkaloids. John Warburton Gates, Jr., Ph.D. Thesis; Stanford University, 1938. pp. 111, Pub. No. 65, (M.A. 1938, No. 1).



CHEMISTRY

Comparative toxicity of selenium in the presence of various sulfur compounds. Bertis Alfred Westfall, Ph.D. Thesis; University of Missouri, 1938. pp. 185, Pub. No. 97. (M.A. 1939, Vol. II, No. 1).

The overall linear expansion of face-centered cubic metals from absolute zero to their melting points. John W. Richards, Ph.D. Thesis; Pa. State College, 1940, pp. 30, Pub. No. 276, (P.S. 1940, Vol. III).

The oxidation of triisobutylene. Carl Shelley Miner, Jr., Ph.D. Thesis; Pa. State College, 1940. pp. 115, Pub. No. 260, (P.S. 1940, Vol. III).

I. The polymeric olefins from methylisopropylcarbinol; II. The reducing action of t-amylmagnesium chloride and related studies; III. The synthesis of nonanes. William Allison Mosher, Ph.D. Thesis; Pa. State College, 1940. pp. 107, Pub. No. 275, (P.S. 1940, Vol. III).

The polymerization of propylene. Joseph F. Laucius, Ph.D. Thesis; Pa. State College, 1940, pp. 196, Pub. No. 259, (P.S. 1940, Vol. III).

I. The reducing action of grignard reagents; II. Studies of Neopentyl alcohol. John David Zech, Ph.D. Thesis; Pa. State College, 1940. pp. 128, Pub. No. 261, (P.S. 1940, Vol. III).

The reduction of acid chlorides with grignard reagents. J. Sam Whitaker, Ph.D. Thesis; Pa. State College, 1940. pp. 85, Pub. No. 268, (P.S. 1940, Vol. III).

The structure of tricalcium aluminate. Lynn Joseph Brady, Ph.D. Thesis; Pa. State College, 1940. pp. 63, Pub. No. 232, (P.S. Vol. III).

Triethylcarbinol and related compounds: Studies on steroidal sapogenins. Eldon Melton Jones, Ph.D. Thesis; Pa. State College, 1940. pp. 97, Pub. No. 264, (P.S. 1940, Vol. III).

CHEMISTRY

I. 2,4,4-trimethyl-1-pentyl compounds; II. Methyl-ethylpinacolylcarbonyl compounds. Leslie Hunt Sutherland, Jr., Ph.D. Thesis; Pa. State College, 1940. pp. 129, Pub. No. 243, (P.S. 1940, Vol. III).

I. The treatment of aliphatic acids with phosphorus pentoxide. II. The reducing action of tertiarybutyl grignard reagent on acyl chlorides. III. A cleavage reaction related to Parts I and II. Harry Means Crooks, Jr., Ph.D. Thesis; Pa. State College, 1938. pp. 112, Pub. No. 73, (P.S. 1938).

DAIRY HUSBANDRY

Carotene and vitamin A in the nutrition of growing dairy cattle. Ruel Elmer Ward, Ph.D. Thesis; Pa. State College, 1938. pp. 167, Pub. No. 80, (P.S. 1938).

DRAMA

The chronology of Greek middle comedy. Francis R. B. Godolphin, Ph.D. Thesis; Princeton, 1938. pp. 166, Pub. No. 52, (M.A. 1938, No. 1).

Schiller and Wagner--A study of their dramatic theory and technique. Marie Haefliger Graves, Ph.D. Thesis; University of Michigan, 1938. pp. 199, Pub. No. 51, (M.A. 1938, No. 1).

ECONOMICS

Economics of the community bonus with special reference to the Missouri boot and shoe industry. Carl Wilburn McGuire, Ph.D. Thesis; University of Missouri, 1939. pp. 332, Pub. No. 218, (M.A. 1941, Vol. III, No. 1).

Experimentalism in economics. August Maffry, Ph.D. Thesis; University of Missouri, 1930. pp. 245, Pub. No. 142, (M.A. 1939, Vol. II, No. 1).



ECONOMICS

The issuance and distribution of corporate securities under the new federal regulation. Leo Tucker Simmons, Ph.D. Thesis; St. Louis University, 1939. pp. 676, Pub. No. 209, (M.A. 1940, Vol. II, No. 2).

National Bank stock as investment. Roy John Wright Ely, Ph.D. Thesis; University of Nebraska, 1938. pp. 283, Pub. No. 54, (M.A. 1938, No. 1).

The organization of the motion picture industry. Rex P. Barrett, Ph.D. Thesis; University of Missouri, 1934. pp. 153, Pub. No. 153, (M.A. 1940, Vol. II, No. 2).

A study of the sales tax with special reference to the Missouri Law of August, 1935. Harold George Gushing, Ph.D. Thesis; St. Louis University, 1937. pp. 244, Pub. No. 197. (M.A. 1940, Vol. II, No. 2).

EDUCATION

The activities and attitudes of Houston Public School teachers. Alva L. Kerbow, Ph.D. Thesis; Colorado State College, 1939. pp. 213, Pub. No. 147, (C.S. 1940).

An analysis of the factors of scientific aptitude as indicated by success in engineering curricula. Margaret Mercer, Ph.D. Thesis; Pa. State College, 1938. pp. 46, Pub. No. 83, (P.S. 1938).

An appraisal of some current elementary school problems. Benjamin C. Watts, Ph.D. Thesis; Colorado State College, 1939, pp. 222, Pub. No. 150, (C.S. 1940).

An approach to an appreciation of art. Edna A. Bortorf, Ed.D. Thesis; Pa. State College, 1940. pp. 269, Pub. No. 231, (P.S. 1940, Vol. III).

The Catholic Elementary School Principal. Sister Mary Theodoretta Zaborowski, Ph.D. Thesis; St. Louis University, 1935. pp. 266, Pub. No. 189, (M.A. 1940, Vol. II, No. 2).

EDUCATION

Certification of teachers in Missouri. Carl Leslie Parker, Ph.D. Thesis; University of Missouri, 1936. pp. 173, Pub. No. 141, (M.A. 1939, Vol. II. No. 1).

Changes from local to state control in Pennsylvania public education as revealed by legislation and litigation. Joseph Thomas Yurkewitch, Ph.D. Thesis; Pa. State College, 1939. pp. 191, Pub. No. 135, (P.S. 1939).

College general methematics for prospective secondary school teachers. Lee Emerson Boyer, Ph.D. Thesis; Pa. State College, 1939. pp. 124, Pub. No. 110, (P.S. 1939).

The comparative cost of vocational industrial education in certain second-class school districts in Pennsylvania. George Harry Parkes, Ph.D. Thesis; Pa. State College, 1939. pp. 120, Pub. No. 128, (P.S. 1939).

A continuous teacher accounting system for Missouri. Clyde William Taylor, Ph.D. Thesis; University of Missouri, 1932. pp. 158, Pub. No. 107, (M.A. 1939, Vol. II, No. 1).

The course offerings of selected three-, four-, and six-year high schools in Nebraska. Louis A. Breternitz, Ph.D. Thesis; Colorado State College, 1939. pp. 197, Pub. No. 151, (C.S. 1940).

Court decisions concerning the powers of the Pennsylvania School Boards. Anson Mark Hamm, Ed.D. Thesis; Pa.. State College, 1940. pp. 262, Pub. No. 255, (P.S. 1940, Vol. III).

A critical and constructive study of the organization, control, and administration of the teacher-training program for religious teachers in Catholic Elementary Schools. Sister M. Etheldreda Heard, Ph.D. Thesis; St. Louis University, 1936. pp. 438, Pub. No. 191, (M.A. 1940, Vol. II, No. 2).



EDUCATION

The development of the control of education in Iran. Abul-Hassan Sassani, Ph.D. Thesis; University of Missouri, 1940. pp. 249, Pub. No. 221, (M.A. 1941, Vol. III, No. 1).

The education of elementary school teachers in Houston, Texas as revealed by collegiate transcripts. Alva L. Kerbow, Ph.D. Thesis; Colorado State College, 1939, pp. 122, Pub. No. 148, (C.S. 1940).

The education of senior high school teachers of Houston, Texas as revealed by collegiate transcripts. Alva L. Kerbow, Ph.D. Thesis; Colorado State College, 1939. pp. 248, Pub. No. 146, (C.S. 1940).

The efficiency of a program of initial instruction on the pronunciation skills at the fourth-grade level as evidenced in skills growth. Ralph W. House, Ed. D. Thesis; Pa. State College, 1940. pp. 433, Pub. No. 228, (P.S. 1940, Vol. III).

An evaluation of curricula in 140 Catholic Secondary Schools of the middle west. Sister M. Rose Kreibich, Ph.D. Thesis; St. Louis University, 1938. pp. 360, Pub. No. 203 (M.A. 1940, Vol. II, No. 2).

Individual versus group instruction in composition; a comparative study of two techniques in incidental teaching. Sidney J. Reedy, Ph.D. Thesis; Colorado State College, 1939. pp. 174, Pub. No. 149, (C.S. 1940).

The location of public junior colleges in Missouri. William Knox Summitt, Ph.D. Thesis; University of Missouri, 1933. pp. 324, Pub. No. 140, (M.A. 1939, Vol. II, No. 1).

A proposed pretheological curriculum for the preparatory schools of the Evangelical Lutheran Synod of Missouri, Ohio and other states. Lawrence George Bickel, Ph.D. Thesis; University of Nebraska, 1938. pp. 251, Pub. No. 56, (M.A. 1938, No. 1).

EDUCATION

Rating student teachers. Charles D. Dean, Ph.D. Thesis; Colorado State College, 1939. pp. 113, Pub. No. 145, (C.S. 1940).

The relative merit of the traditional and the reorganized school as preparation for freshmen at the Pennsylvania State College. Elizabeth Briton Meek, Ph.D. Thesis; Pa. State College, 1938. pp. 198, Pub. No. 82, (P.S. 1938, No. 1).

Relative values of freshman-sophomore courses as predictors of scholastic success in the professional schools and colleges of the University of Missouri. Weldon Perry Shofstall, Ph.D. Thesis; University of Missouri, 1932. pp. 172, Pub. No. 152, (M.A. 1940, Vol. II, No. 2).

Ruling case law definitions of certain teacher tenure terms. Kenneth Buell Waterbury, Ph.D. Thesis; Pa. State College, 1939. pp. 105, Pub. No. 133, (P.S. 1939).

Safety and health instruction and practice in school shops. Edward C. Estabrooke, Ph.D. Thesis; Pa. State College, 1939. pp. 251, Pub. No. 114, (P.S. 1939).

A social studies program for the non-academic pupil. Lee Donald Warren, Ed.D. Thesis; Pa. State College, 1940. pp. 157, Pub. No. 227, (P.S. 1940, Vol. III).

Status of senior high school promotion plans. J. F. Montague, Ph.D. Thesis; University of Missouri, 1926. pp. 332, Pub. No. 143, (M.A. 1939, Vol. II, No. 1).

A study of special education of mentally handicapped children in third class school districts in Pennsylvania. Charles Cox, Ph.D. Thesis; Pa. State College, 1939. pp. 100, Pub. No. 113, (P.S. 1939).

A study of vocations: An investigation into the environmental factors of vocations to the Priesthood and the religious life in the United States from 1919 to 1929. Rev. Thomas Stephen Bowdern, Ph.D. Thesis; St. Louis University, 1936. 2 Vols., 1016 pp. Pub. No. 190, (M.A. 1940, Vol. II, No. 2).



EDUCATION

Uniform financial accounting system for the public schools of Illinois. Eugene H. Mellon, Ph.D. Thesis; Colorado State College, 1939. pp. 207, Pub. No. 144, (C.S. 1940).

ENGINEERING

Density relationships as they affect the structural properties of stabilized soil-cement mixture. Ang-Tsung Liu, Sc.D. Thesis; University of Michigan, 1940. pp. 202, Pub. No. 210, (M.A. 1940, Vol. II, No. 2).

ENGLISH LITERATURE

The Catholic Church in the Jacobean Drama. Sister Mary Charlotte Bonneville, Ph.D. Thesis; St. Louis University, 1939. pp. 250, Pub. No. 207, (M.A. 1940, Vol. II, No. 2).

The critical opinions of John Dryden. Brother Thomas Joseph Treadaway, Ph.D. Thesis. St. Louis University, 1938. pp. 486, Pub. No. 206, (M.A. 1940, Vol. II, No. 2).

Francis Thompson: His theory of poetry. Norman Thomas Weyand, Ph.D. Thesis; St. Louis University, 1934, pp. 275. Pub. No. 182, (M.A. 1940, Vol. II, No. 2).

An historical dictionary of baseball terminology. Edward J. Nichols, Ph.D. Thesis; Pa. State College, 1939. pp. 112, Pub. No. 127, (P.S. 1939).

The proletarian novel in America. John Scott Bowman, Ph.D. Thesis; Pa. State College, 1939. pp. 194, Pub. No. 109, (P.S. 1939).

The refrain in the English and Scottish popular ballads. Patrick Ward Gainer, Ph.D. Thesis; St. Louis University, 1933. pp. 101, Pub. No. 172, (M.A. 1940, Vol. II, No. 2).

FUEL TECHNOLOGY

Investigations upon certain Pennsylvania coals. Allan G. Sandhoff, Ph.D. Thesis; Pa. State College, 1938. pp. 71, Pub. No. 86, (P.S. 1938).

GEOGRAPHY

The peopling of the middle Willamette Valley. Lloyd D. Black, Ph.D. Thesis; University of Michigan, 1940. pp. 192, Pub. No. 163, (M.A. Vol. II, No. 2).

GERMAN

The romance element in the vocabulary of Grimmelhausen's Simplicissimus. Harold Wildie Weigel, Ph.D. Thesis; Pa. State College, 1940. pp. 176, Pub. No. 270, (P.S. 1940, Vol. III).

GREEK

Homeric man's sense of dependence on the gods in the light of christian principles. Rev. Alphonse Mary Zambara, Ph.D. Thesis; St. Louis University, 1936. pp. 233, Pub. No. 194, (M.A. 1940, Vol. II, No. 2).

Parataxis by means of Kai in the Gospel of St. Luke. George Edward Ganss, Ph.D. Thesis; St. Louis University, 1934. pp. 334, Pub. No. 177, (M.A. 1940, Vol. II, No. 2).

HISTORY

Bishop Odin and the new era of the Catholic Church in Texas, 1840-1860. Sister Mary Benignus Sheridan, Ph.D. Thesis; St. Louis University, 1937. pp. 419, Pub. No. 204, (M.A. 1940, Vol. II, No. 2).

The British West Indies in eclipse, 1838-1902. Homer Carroll Huitt, Ph.D. Thesis; University of Missouri, 1937. pp. 312, Pub. No. 139, (M.A. 1939, Vol. II, No. 1).



HISTORY

The Catholic Church on the Oklahoma frontier, 1824-1907. Sister M. Ursula Thomas, Ph.D. Thesis; St. Louis University, 1938. pp. 392, Pub. No. 205, (M.A. 1940, Vol. II, No. 2).

English public opinion and the colonies under the restored Stuarts, Charles II and James II 1660-1689. William Harris McClure, Ph.D. Thesis; University of Michigan, 1938. pp. 233, Pub. No. 64, (M.A. 1938, No. 1).

The Episcopal oath. An historical study of its origin and development to 1600 with special reference to England. Rev. Charles Earl Schrader, Ph.D. Thesis; St. Louis University, 1933. pp. 172, Pub. No. 175, (M.A. 1940, Vol. II, No. 2).

The history of the early Jesuit Missions in Kansas. Arthur T. Donohue, Ph.D. Thesis; University of Kansas, 1940. pp. 256, Pub. No. 160, (M.A. 1940, Vol. II, No. 2).

The history of the sisters of Loretto in the Trans-Mississippi West: An historical study of origins and westward expansion from 1812 to 1935. Sister May Lilliana Owens, Ph.D. Thesis; St. Louis University, 1935. pp. 647, Pub. No. 186, (M.A. 1940, Vol. II, No. 2).

Humanitarianism and British Colonial Policy, 1807-1854. Sister Mary Casilda Renwald, Ph.D. Thesis; St. Louis University, 1934. pp. 275, Pub. No. 180, (M.A. 1940, Vol. II, No. 2).

Nebraska in the Spanish-American War and the Philippine insurrection: A study in imperialism. John Reuben Johnson, Ph.D. Thesis; University of Nebraska, 1938. pp. 405, Pub. No. 59, (M.A. 1938, No. 1).

Orestes A. Brownson: American Political Philosopher. Paul Robert Conroy, Ph.D. Thesis; St. Louis University, 1937. pp. 399, Pub. No. 195, (M.A. 1940, Vol. II, No. 2).

HISTORY

The pre-Revolutionary Irish in New York (1643-1775). Richard David Doyle, Ph.D. Thesis; St. Louis University, 1932. pp. 287, Pub. No. 169, (M.A. 1940, Vol. II, No. 2).

Secular aspects of the English Episcopate in the reigns of Henry III (1216-1272) and Edward I (1272-1307). Louis William Doll, Ph.D. Thesis; University of Michigan, 1937. pp. 262, Pub. No. 108, (M.A. 1939, Vol. II, No. 1).

HOME ECONOMICS

A study of the nutritional status of children, with special reference to haemoglobin and iron intake. Woot Tsuen Ng, Ph.D. Thesis; Pa. State College, 1940. pp. 298, Pub. No. 248, (P.S. 1940, Vol. III).

A study of stain removal and of the use of chlorine and of hydrogen peroxide bleaches in the power laundry. Polly Bell Kessinger, Ph.D. Thesis; Pa. State College, 1938. pp. 190, Pub. No. 87, (P.S. 1938).

HORTICULTURE

An ecological, pathological and gentical study of pyrethrum (*Chrysanthemum Cinerariaefolium* Vis.) as related to possible commercial production in the United States. Raymond Eugene Culbertson, Ph.D. Thesis; Pa. State College, 1940. pp. 289, Pub. No. 258, (P.S. 1940, Vol. III).

INDUSTRIAL EDUCATION

Teacher-education programs and the preparation and teaching positions of industrial education teachers in Illinois. Russell Henry Landis, Ed.D. Thesis; Pa. State College, 1940. pp. 196, Pub. No. 230, (P.S. 1940, Vol. III).

JOURNALISM

The relation of background study to editorial effectiveness. Stuart Ansala Mahuran, Ph.D. Thesis; University of Missouri, pp. 203, Pub. No. 220, (M.A. 1941, Vol. III, No. 1).



LATIN

A lexicographical and stylistic study of the de Incarnatione Jesu Christi Domini Nostri and the de miraculis Sanctae Mariae Laudunensis of Hermannus Tornacensis. John Justin Jolin, Ph.D. Thesis; St. Louis University, 1938. pp. 136, Pub. No. 202, (M.A. 1940, Vol. II, No. 2).

The satirical element in the letters of Saint Jerome. Henry William Linn, Ph.D. Thesis; St. Louis University, 1933. pp. 555, Pub. No. 178, (M.A. 1940, Vol. II, No. 2).

A study of the Latinity of "De Miraculis Libri Duo" by Peter the Venerable (Circa 1092-1156), The Ninth Abbot of Cluny. Rev. William Robert Hennes, Ph.D. Thesis; St. Louis University, 1937. pp. 111, Pub. No. 198, (M.A. 1940, Vol. II, No. 2).

A study of the Latinity of the Sermones and the Carmina of Peter the Venerable, Ninth Abbot of Cluny. John Joseph Hodnett, Ph.D. Thesis; St. Louis University, 1938. pp. 182, Pub. No. 201, (M.A. 1940, Vol. II, No. 2).

A study of the vocabulary of Pope Calixtus II in his "Epistolae et Privilegia." Rev. Arthur Francis Hoogstraet, Ph.D. Thesis; St. Louis University, 1937. pp. 236, Pub. No. 199, (M.A. 1940, Vol. II, No. 2).

LITERATURE

The ethical conception of literature in English literary theory. Miriam Smyth, Ph.D. Thesis; University of Kansas. pp. 603, Pub. No. 216, (M.A. 1941, Vol. III, No. 1).

MATHEMATICS

Charts and tables for prediction in psychology and education. Harold D. Griffin, Ph.D. Thesis; University of Missouri, 1929. pp. 296, Pub. No. 105, (M.A. 1939, Vol. II, No. 1).

MATHEMATICS

A study of a universe of N finite populations with application to moment-function adjustments for grouped data. Joseph Alphonso Pierce, Ph.D. Thesis; University of Michigan, 1938. pp. 95, Pub. No. 63, (M.A. 1938, No. 1).

MECHANICAL ENGINEERING

Ignition quality rating of Diesel fuels by commercial engines. Jasper S. Chandler, Ph.D. Thesis; Pa. State College, 1938. pp. 137, Pub. No. 88, (P.S. 1938).

METALLURGY

Effect of 1/2 percent or less of some alloying elements on the hardness and microstructure of pure 1.1 percent carbon steels. Bertrand Saunders Norris, Ph.D. Thesis; Pa. State College, 1940. pp. 116, Pub. No. 249, (P.S. 1940, Vol. III).

PHILOLOGY

Concord of number in modern English with special reference to the indefinites. Florence Gray Beall, Ph.D. Thesis; University of Michigan, 1933. pp. 53, Pub. No. 104, (M.A. 1939, Vol. II, No. 1).

Functional grammar and its relation to correct English usage. Mary Fee, Ph.D. Thesis; University of Kansas. pp. 130, Pub. No. 215, (M.A. 1941, Vol. III, No. 1).

Rythm in literature parallels the scale of specificity in speech development. L. Adeline Pierce, Ph.D. Thesis; University of Michigan, 1940. pp. 154, Pub. No. 168, (M.A. 1940, Vol. II, No. 2).

FRENCH PHILOLOGY

A metrical study of the three successive versions of Gervais de Basire's Lycoris with special attention to the observance of the principles of Malherbe. Emma Louisa Moon, Ph.D. Thesis; University of Michigan, 1940. pp. 311, Pub. No. 158, (M.A. 1940, Vol. II, No. 2).



PHILOSOPHY

Action-logical, methaphysical, and normative in Maurice Blondel. Robert Jacques, Ph.D. Thesis; Toronto University, 1938. pp. 110, Pub. No. 62, (M.A. 1938, No. 1).

Actual Entities--A study of A. N. Whitehead's theory of reality. A. H. Johnson, Ph.D. Thesis; Toronto University, 1938. pp. 217, Pub. No. 61, (M.A. 1938, No. 1).

The American new realist concept of substance with special reference to the substantiality of the self or ego. Josephine Folk Mulvihill, Ph.D. Thesis; St. Louis University, 1932. pp. 270, Pub. No. 170, (M. A. 1940, Vol. II, No. 2).

Bergsonian metaphysics and God. Stewart Edward Dollard, Ph.D. Thesis; St. Louis University, 1933. pp. 236, Pub. No. 176, (M.A. 1940, Vol. II, No. 2).

A Comparison of the de Magistro of Saint Augustine with the de Magistro of Saint Thomas. Wm. Ligon Wade, Ph.D. Thesis; Saint Louis University, 1934. pp. 222, Pub. No. 188, (M.A. 1940, Vol. II, No. 2).

Francis Suarez and the Natural Moral Law. Reverend Stephen James Rueve, Ph.D. Thesis; St. Louis University, 1933. pp. 289, Pub. No. 174, (M.A. 1940, Vol. II, No. 2).

Lenin's Materialism: An evaluation of the philosophical basis of Russian Communism. Rev. Reginald Raymond Lefebvre, Ph.D. Thesis; St. Louis University, 1936. pp. 265, Pub. No. 193, (M.A. 1940, Vol. II, No. 2).

A philosophical appraisal of the modernist gnosticism of Nicholas Berdyaev. Rev. Paul Vincent Kennedy, Ph. D. Thesis; St. Louis University, 1936. pp. 248, Pub. No. 192, (M.A. 1940, Vol. II, No. 2).

The problem of the plurality of substantial forms in a compound as treated by St. Albert the Great. Rev. Jerome George Lemmer, Ph.D. Thesis; St. Louis University, 1937. pp. 175, Pub. No. 200, (M.A. 1940, Vol. II, No. 2).

PHYSICAL EDUCATION

Gaps, overlappings, and other weaknesses in undergraduate professional training in physical education as experienced in practical situations. John Wynn Fredericks, Ed. D. Thesis; Pa. State College, 1940. pp. 221, Pub. No. 229, (P.S. 1940, Vol. III).

PHYSICS

Heat of formation of nickelous oxide. Robert Edgar Lake, Ph.D. Thesis; Pa. State College, 1940. pp. 29, Pub. No. 277, (P.S. 1940, Vol. III).

An improved method of making Geiger points and the construction of a multiple point counter. Austin Clement McTigue, Ph.D. Thesis; St. Louis University, 1939. pp. 90, Pub. No. 208, (M.A. 1940, Vol. II, No. 2).

The influence of high pressure on the refractive index and the dispersive power of glycerine. Rev. Charles Kavanagh Hayden, Ph.D. Thesis; St. Louis University, 1933. pp. 65. Pub. No. 173, (M.A. Vol. II, No. 2).

An interferometric study of the triplet systems of  $D_2$  and  $H_2$ . Raymond B. Dull, Ph.D. Thesis; Pa. State College, 1938. pp. 33, Pub. No. 89, (P.S. 1938).

An investigation of the peak, average, and effective currents and voltages occurring in the series Ferroresonant circuit. John Frazer Lamb, Sc.D. Thesis; University of Michigan, 1940. pp. 176, Pub. No. 167, (M.A. 1940, Vol. II, No. 2).

A new vector wave motion theory. Rev. George Anthony O'Donnell, Ph.D. Thesis; St. Louis University, 1935. pp. 39, Pub. No. 185, (M.A. 1940, Vol. II, No. 2).

Preferred orientations in rolled and recrystallized aluminum. James W. Ford, Ph.D. Thesis; Pa. State College, 1940. pp. 17, Pub. No. 256, (P.S. 1940, Vol. III).

Quantum efficiency of Geiger-Müller counters for x-ray intensity measurements. Harris Martin Sullivan, Ph.D. Thesis; Pa. State College, 1938. pp. 54, Pub. No. 92, (P.S. 1938).



PHYSICS

Raman spectra of fluorocarbons. Robert L. Weber, Ph.D. Thesis; Pa. State College, 1938. pp. 31, Pub. No. 95, (P.S. 1938).

Supersonic velocity and absorption measurements in oxygen mixed with foreign gases. Paul Miller Kendig, Ph.D. Thesis; Pa. State College, 1938. pp. 27, Pub. No. 90, (P.S. 1938).

X-ray study of the  $A_3$  point of pure iron using the Geiger-Muller Counter. Alton P. Wangsgard, Ph.D. Thesis; Pa. State College, 1940. pp. 44, Pub. No. 265, (P.S. 1940, Vol. III).

POLITICAL SCIENCE

Agrarian politics in Missouri 1880-1896. Homer Clevenger, Ph.D. Thesis; University of Missouri. pp. 352, Pub. No. 222, (M.A. 1941, Vol. III, No. 1).

Council-manager government in Kansas City. Henry Macmillan Alexander, Ph.D. Thesis; University of Missouri, 1934. pp. 428, Pub. No. 106, (M.A. 1939, Vol. II, No. 1).

The Philippines, the powers, and the Spanish-American War: A study of foreign policies. James K. Eyre, Ph.D. Thesis; University of Michigan, 1940. pp. 319, Pub. No. 154, (M.A. 1940, Vol. II, No. 2).

Rose Luxemburg and the German social democratic party. Charles Easton Rothwell, Ph.D. Thesis; Stanford Univ., 1938. pp. 683, Pub. No. 67, (M.A. 1938, No. 1).

PSYCHOLOGY

A comparison of certain visual factors with the efficiency of textile inspectors. Arthur W. Ayers, Ph.D. Thesis; Pa. State College, 1940. pp. 60, Pub. No. 252, (P.S. 1940, Vol. III).

An experimental investigation of the process of inductive discovery with groups of closely similar problems of variable complexity. Rev. Charles Ignatius Doyle, Ph.D. Thesis; St. Louis University, 1933. pp. 124, Pub. No. 171, (M.A. 1940, Vol. II, No. 2).

PSYCHOLOGY

A factor analysis of a vocational guidance test battery. Edward J. Carr, Ph.D. Thesis; Pa. State College, 1939. pp. 41, Pub. No. 112, (P.S. 1939).

The flight of colors following intense brief stimulation of the eye. Margaret Ives, Ph.D. Thesis; University of Michigan, 1938. pp. 134, Pub. No. 66, (M.A. 1938, No. 1).

Form discrimination as a learning cue in infants. Bing-chung Ling, Ph.D. Thesis; University of Michigan, 1939. pp. 303, Pub. No. 98, (M.A. 1939, Vol. II, No. 1).

Individual differences in behavior resulting from experimentally induced frustration. Clifford Rose Adams, Ph.D. Thesis; Pa. State College, 1940. pp. 196, Pub. No. 271, (P.S. 1940, Vol. III).

A non-verbal approach to the thurstone primary mental abilities. Dannie J. Moffie, Ph.D. Thesis; Pa. State College, 1940. pp. 57, Pub. No. 247, (P.S. 1940, Vol. III).

A qualitative and quantitative appraisal of reading experiences. Frederick L. Pond, Ph.D. Thesis; Pa. State College, 1939. pp. 148, Pub. No. 130, (P.S. 1939).

Symmetry and asymmetry in form abstraction by children. Charles H. Crudden, Ph.D. Thesis; University of Michigan, 1937. pp. 69, Pub. No. 99, (M.A. 1939, Vol. II, No. 1).

A typological approach to the study of human behavior. Herbert Shuey, Ph.D. Thesis; University of Kansas, 1940. pp. 297, Pub. No. 159, (M.A. 1940, Vol. II, No. 2).

ROMANCE LANGUAGE

The theme of death in the essays of Montaigne. Wilford Paul Musgrave, Ph.D. Thesis; Pa. State College, 1938. pp. 187, Pub. No. 96, (P.S. 1938).



SOCIOLOGY

The adolescent girl: An analysis of her attitudes, ideals, and problems from the viewpoint of the girl herself. Sister M. Mildred Knoebber, Ph.D. Thesis; St. Louis University, 1934. pp. 293, Pub. No. 184, (M.A. 1940, Vol. II, No. 2).

An educational survey of the state industrial home for girls in Missouri at Chillicothe. Anna Verona Burns, Ph.D. Thesis; University of Missouri, 1935. pp. 150, Pub. No. 137, (M.A. 1939, Vol. II, No. 1).

The social problems in the writings of Rene Bazin. Nan E. Wade, Ph.D. Thesis; University of Missouri, 1938. pp. 126, Pub. No. 101, (M.A. 1939, Vol. II, No. 1).

Transient men in Missouri. A descriptive analysis of transient men and of the activities of agencies dealing with them. John Paul McKinsey, Ph.D. Thesis; University of Missouri, 1940. pp. 310, Pub. No. 219, (M.A. 1941, Vol. III, No. 1).

THEOLOGY

Theophany: A study of the nature of God and His manifestations from the works of Joannes Scotus Eriugena, ninth century Irish philosopher. Edward Charles McCue, Ph.D. Thesis; St. Louis University, 1933. pp. 313, Pub. No. 179, (M.A. 1940, Vol. II, No. 2).

ZOOLOGY

A genetic study of dental caries in the albino rat (*Rattus Norvegicus*). William Grady Erwin, Ph.D. Thesis; Michigan State College, 1940. pp. 83, Pub. No. 157, (M.A. 1940, Vol. II, No. 2).

The gross anatomy of Cavia Cobaya with a comparative study of another hystricomorph rodent, Erethizon Dorsatus. Overton T. Ballard, Ph.D. Thesis; University of Kansas, 1940. pp. 511, Pub. No. 162, (M.A. 1940, Vol. II, No. 2).

ZOOLOGY

The osteology and myology of the fox squirrel, the gray squirrel, and the red squirrel. Harold S. Orwell, Ph.D. Thesis; Michigan State College, 1940. pp. 165, Pub. No. 156, (M.A. 1940, Vol. II, No. 2).

Studies on the muscles of the pelvic appendage in birds. George Elford Hudson, Ph.D. Thesis; University of Nebraska, 1938. pp. 196, Pub. No. 60, (M.A. 1938, No. 1).